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$\mathcal{L}^{3,468}$

$C8 \cdot 7$
DEACON (διάκονος, minister, servant), the name given to the lowest order of minister in the Christian church. From the appointment of the seven Hellenic deacons (Acts vi.) we learn that their duty under the apostles was simply to distribute alms from the public fund. In the early church, however, they soon came to discharge higher functions. They assisted the bishop and presbyter in the service of the sanctuary; in the administration of the Eucharist they handed the elements to the people; they instructed the catechumens, and in some cases baptized; and the archdeacons came to exercise in the 6th century the judicial power of the bishop over the inferior clergy.

In the Church of England the form of ordaining deacons declares that it is their office to assist the priest in the distribution of the holy communion; in which, agreeably to the practice of the ancient church, they are confined to the administering of the wine to the communicants. A deacon in England is not capable of holding any benefice, yet he may officiate as a private chaplain, or curate to a beneficed clergyman, or as lecturer in a parish church. He may be ordained at twenty-three years of age, anno currente, but it is expressly provided that the bishop shall not ordain the same person a priest and deacon on the same day. In Presbyterian churches, as in apostolic times, the deacons charge only of the pecuniary affairs of the congregation. In the Roman Catholic Church it is the deacon's office to incense the officiating priest or presbyter, to lay the corporal on the altar; to receive the paten or cup from the sub-deacon, and present it to the person officiating; to incense the choir; to receive the pix from the officiating presbyter, and to carry it to the sub-deacon; and at a pontifical mass, when the archbishop gives the blessing, to put the mitre on his head, and to take off the archiepiscopal pall and lay it on the altar.

Deaconess.—This was the title of a ministry to which women were appointed in the early church, whose duty it was to perform certain functions towards female catechumens during the ceremony of baptism by immersion, which could not so well be performed by the deacons. Their age was at first fixed at sixty years, but it was afterwards reduced to forty years, and no married woman was eligible to the office. Abuses gradually became prevalent amongst the deaconesses, which led to the suppression of their ministry in the Latin church in the 6th century. The office was abolished in the Greek church in the 12th century.

DEAD SEA, the largest lake in Palestine, and physically, as well as historically, among the most remarkable in the world. It is called in Scripture The Salt Sea (Gen. xiv. 3), The Sea of the Plain, or more correctly of the Arabah (Deut. iii. 17), and The East Sea ( Ezek. xlv. 18). Josephus calls it the Asphaltic Lake (B. J. iii. 16, 17), a name adopted by classic writers in allusion to the bitumen, or asphaltum, which abounds in its basin. Jerome gave it the name Dead Sea because its waters are fatal to animal life, and in the Talmud it is called the Sea of Sodom. Its common name among the inhabitants of Palestine is Baharret Litt, "The Sea of Lot."

The sea is 46 miles long, and varies from 5 to 9 in breadth. Its bed is the lowest part of the great valley of the Jordan; and its surface has a depression of no less than 1308 feet beneath the level of the ocean. The Jordan valley itself, for a distance of about 80 miles to the northward and 30 to the southward, is also below the level of the ocean. The general contour of the sea is an elongated oval, with a number of bold promontories and deep bays along the western shore, and a large, low peninsula on the south-east. It is shut in on the east and west by parallel ranges of mountains which rise steeply, and in some places in precipices of naked rock, from the water. The western range is the mountain chain of Judah, and is composed of white limestone intermixed with yellow and reddish strata. Its whole eastern slopes are bare, rugged, and desolate, forming that wilderness in which David found an asylum, in which the Baptist preached, and in which our Lord was tempted. The average height of the cliffs along the shore is about 2000 feet; but they are deeply fissured by torrent beds, which are all dry in summer. There are, however, a few fountains in the gels and near the shore, the most celebrated of which is the Biblical Engedi. At the north-west curve of the sea are extensive salt marshes, and at the south-west is a range of hills of rock salt, 7 miles long and 300 feet high, called Kasam Udom, "The ridge of Sodom." On the south of the sea lies a low marshy plain, partially covered with jungles of reeds, tamarisk, and bracken.
The mountain range along the eastern side of the Dead Sea is the sustaining wall of the tableland of Moab, which has an elevation of about 2800 feet, and is therefore 4000 feet above the lake. At the southern end the range is composed of red sandstone, a continuation of the "red" mountains of Edom. At the valley of Kerak the sandstone gives place to limestone; but further north it again appears in thick strata below the limestone. The range is intersected by the deep and wild ravines of Kerak (the Kir of Moab of the Bible), Moeab (the ancient Armon), and Zerka Main (Mom). A few miles from the mouth of the latter are the warm springs of Callirhoe, famous in Jewish and Roman times. A copious stream of warm sulphureous water flows into the lake between stupendous cliffs of sandstone. North of Zerka Main the cliffs along the shore are sandstone, but higher up the limestone overlies the sandstone, while dykes and seams of old trap-rock also occur. At the mouth of the ravine of Kerak, on the south-east of a little peninsula near the mouth of the Jordan. The presence of so much saline matter is accounted for by the washings of the salt range of Sodom and the great evaporation. The reports of early travellers, however, regarding the Dead Sea were to a great extent fabulous. They represented it as an infernal region, its black and fetid waters always emitting a noisome vapour, which being driven over the adjoining land destroyed all vegetation; they also stated that no birds could fly over it. All this is untrue; the water is as transparent as that of the Mediterranean, and a bath in it is both pleasant and refreshing.

The historical notices of the Dead Sea extend back nearly 4000 years. When Lot looked down from the heights of Bethel, he "saw all the plain of the Jordan that it was watered before the Lord destroyed Sodom, even as the garden of the Lord" (Gen. xiv. 10). The region is further described as a "deep valley" (Emek, Gen. xiv. 3, 8), distinguished by "fertile fields" (Siddim). The aspect now is entirely different. There must have been a lake then as now; but it was smaller, and had a margin of fertile plain, especially on the southern end, "as thou comest unto Zoar." In the narration of the capture of the cities of the plain by the Eastern kings, it is said that they were situated in the "vale of Siddim," which was full of "bitumen (slime) pits." When the cities were destroyed, "the Lord rained upon Sodom and upon Gomorrah brimstone and fire from the Lord out of heaven"; and Abraham from the mountain ridges "looked toward Sodom, and toward all the land of the plain, and, lo, the smoke of the country went up as the smoke of a furnace" (Gen. xix. 24, 28). The sacred writer further asserts regarding the vale of Siddim that it became the Salt Sea, or was submerged; and consequently it now forms part of the bed of the lake. These events entirely changed, as it would seem, both the political and physical condition of the whole region. Upon the plains originally existing round the sea Gentile and Jewish records combine in placing the earliest seat of Phoenician civilization. "The Tyrians," says Justin, "first built by the Syrian lake of Socon to Sidon." Sodom and Gomorrah are mentioned as the first cities of the Canaanites; and when Lot went down from Bethel "the cities of the plain" formed a nucleus of civilized life before any city, except Hebron and perhaps Jerusalem, had sprung up in central Palestine. The great catastrophes in the days of Abraham changed the aspect of the country, and gave a death-blow to its prosperity. With the exception of the village of Engedi, and the small town of Jericho, the circuit of the Dead Sea appears to have remained ever afterwards almost without settled inhabitants.

Recent researches, especially those of M. Lartet, the Duke of Luytens, and others, have greatly to our knowledge of the physical geography of the Dead Sea basin. It is now shown from the geological
structure of the watershed in the valley of the Arabah to the south, and from the direction of the lateral ravines which fall into the great Jordan valley, that the river Jordan could never have run into the Red Sea. The depression of the Dead Sea in 1938 feet, while the elevation of the watershed is 787 feet; and the action which upheaved the watershed occurred at the same geological period which gave to the whole of Palestine its present form.

The formation of the Jordan valley M. Lartet accounts for in this way. At some remote period a fracture took place in the upper strata in this region, extending north and south. In consequence of the unequal strength of the strata the western side of the fracture sank, occasioning the abrupt dip observable in the strata on the western side of the valley, and the great depression of the valley itself; while the eastern side of the fracture remained in situ, showing at various places along the eastern shore of the Dead Sea a vertical section through the limestone and sandstone. The basin of the Dead Sea has thus been since its foundation a reservoir for the rainfall; while its salinity originally proceeded from the with spring and hils, and gradually increased by evaporation.

Deposits of great depth have accumulated in the whole valley since its formation, composed of beds of gypsum, marl, flint, and alluvium, similar to those now in process of formation at the bottom of the Dead Sea. They show that at one period the whole Jordan valley was under water, while the sides of the valley indicate successive stages in the fall of the water from the time when its surface was on the level of the ocean down to the present age. The hillsides and stripS of plain on both the eastern and western banks of the Dead Sea are marked by a series of terraces or shore-lines. The highest has an elevation corresponding to the level of the Mediterranean. About 300 feet above the present level of the lake there is another shore-line, marked by a strip of alluvial marl adhering to the rocks and cliffs, particularly at the north-west angle. The deposit is mixed with shells of existing species, layers of gypsum and gravel. This line would correspond with the general level of the great valley northward, through which the river Jordan has cut a deep channel. There are, besides, in the ravines which descendent to the lake, comparatively large deposits, reaching up their sides in places to a height of 400 feet, and then sloping down in a series of terraces to the present level of the lake, showing the gradual depression of the water. Tristram also remarked on the western shore "no less than eight low gravel terraces, comparatively recent boulder, distinctly marked. The highest of them was 44 feet above the present sea-level."

Many traces of volcanic action, both remote and recent, have been observed in the basin of the Dead Sea, such as trap dykes, and hot sulphur and brackish springs. Tristram describes a valley at the northern end of the salt range of Sodom, in which there are "large masses of bitumen mangled with gravel. These overlie a thick stratum of sulphur, which seems thicker a stratum of sand so strongly impregnated with sulphur that it yields powerful flames on being sprinkled over a hot coal. The bitumen, unlike that which we pick up on the shore, is strongly impregnated with sulphur. Above all, it is calcined, and bears the marks of having been subjected to extreme heat. So far as I can understand this deposit, but it has any physical evidence left of the catastrophe which destroyed Sodom and Gomorrah, or of similar occurrences, we have it here. The whole appearance points to a shower of hot sulphur, and an eruption of bitumen upon it, which would naturally be calcined and impregnated with its flames; and thus at a geological period quite subsequent to all the alluvial and volcanic action of which we have such abundant evidence. The catastrophe must have been since the formation of the valley, and while the water was at its present level,—therefore, probably during the historic period (J. L. P.)"

Tristram applies the above-observed facts to the solution of the great historical question about the destruction of the cities of the plain in the following manner.

"Setting aside all preconceived notions, and taking the simple record of Genesis six as we find it, let us see whether the existing condition of the country is at all capable of the Biblical narration. Certainly we do observe by the lake sulphur and bitumen in abundance. Sulphur springs stud the shores, sulphur is strewed, whether in layers or in fragments, over the desolate plains. The bitumen is ejected in great floating masses from the bottom of the sea, oozes through the fissures of the rocks, as deposed with gravel on the beach, or appears with sulphur to have been precipitated during some conflagration. We know that at the time of earthquakes bitumen seems to be detached from the bottom of the lake. Everything leads to the conclusion that the agency of fire was at work. The kindling of such a mass of combustible material, either by lightning from heaven, or by other electrical agency, combined with an earthquake ejecting other bitumen or sulphur from the lake, would soon spread devastation over the plain, so that the smoke of the country would go up as the smoke of a furnace." (Land of Israel, p. 450)

Here we have to do only with physical facts and appearances. A mass of burning sulphurous matter might be ejected from some open crater, as is often the case with Vesuvius, and thus, falling upon the combustible parts of the country, the bituminous plain around, and the hot sulphur and brackish springs. But we have not only the extraordinary occurrence of a conflagration, but also an earthquake, which, by its violence, would have been sufficient to produce a profound conflagration. The conclusion is inevitable that an earthquake did take place. This conclusion is supported by the testimony of Josephus (Ant. xv. 1, 2) that the Moabites crossed it to invade Judah, and he tells us the Romans used boats against the fugitive Jews (B. J. iv. 7, 8). Costigan was the first in modern times to navigate it, going from the mouth of the Jordan to the peninsula of Lisan in the boat which he had come from Tiberias. He afterwards died of fatigue and exhaustion. In 1837 Moore and Beck conveyed a little boat from Joppa, and visited some points. Ten years later Lieutenant Molyneux took a boat to the peninsula, and his life was also sacrificed. The expedition of Lynch was far more successful, and he was the first thoroughly to examine the shores and to determine the depth by soundings. Several of his party took the fever which is so fatal, and one died. Winter is the proper season for such researches. Rain seldom falls, and the air during the depth of winter is fresh, and cold almost unknown.

The following are the leading works which treat of the Dead Sea—Robinson, Physical Geography of Palestine, De Saulcy, Voyage autour de la Mer Morte, Lynch, Official Report to United States Government, Ritter, Comparative Geography of Palestine, vol. iii. appendix to.

DEADLY NIGHTSHADE See Belladonna.

DEAF AND DUMB It is not uncommon supposition that deaf mutes are dumb on account of some vocal or organic defect, whereas the dumbness arises, with very rare exceptions, from the deprivation of hearing and some natural or accidental disease. Where partial or total dumbness exists with the sense of hearing perfect, it will be generally found to proceed either from great nervous debility or from some mental derangement, and not, as is often supposed, from deafness. A deaf mute, in which the congenitally deaf, with hardship an exception, are in their normal condition. Many children who are enumerated as congenitally deaf have the sense of hearing to a greater or less degree, but not to such an extent as to be of service to them in the acquisition of language. It is remarkable that the defect of hearing is not generally dis-
covered till an advanced period of childhood, and though the child remains mute the real cause is neither readily acknowledged nor properly attended to. Children who have lost their hearing after the acquisition of the power of speech cannot be included in the class of deaf mutes; the impression which language has made on their minds gives to them a marked superiority over those who are deaf from birth.

Such a calamity as the deprivation of hearing must be productive of great and varied disadvantages, as it totally excludes the mind from an extensive class of ideas and associations. It is then not to be wondered at that this state of social isolation should occasionally give rise to moroseness and despondency, and that external objects should inspire little sense of surprise or admiration. They are simply objects recognized by their form, colour, and texture, and the emotions they raise are different both in character and in intensity from those experienced by hearing children. This physical defect has not, however, any necessary connection with the presence or absence of intellectual faculties, or with the action or reaction of the senses, especially that of sight. Thus the visible marks of attention the deaf and dumb receive from others,—their caresses, frowns, and smiles,—all make a corresponding impression on their tender minds, and as they grow older they watch the looks and gestures of those near them with keenness unknown to other children, so that the slightest change of expression does not escape their observation. Their affections are stimulated and their passions excited much in the same way as in other children.

The proportion of children born deaf was formerly supposed to be much smaller than it really is. Cases have come to be known in largely increased numbers since institutions for the deaf and dumb have been established, and such statistical tables as are given in this article suggest the incorrectness of the popular supposition. The institutions which have been founded on their behalf have not only diffused correct information concerning their number, but by the gratifying success of the educational methods adopted have greatly contributed to dissipate the prevalent prejudices, and to direct public sympathy towards the claims of this class. The latter office it is still needful that they should fulfil, for prejudice yet exist against deaf mutes,—one of these being the general supposition that they are very vicious and bad-tempered. It may be admitted that some of them are so; and it may even be granted that the proportion of mutes with such dispositions is as high as in any other class of afflicted persons, for in the case of the deaf and dumb there are undoubtedly special circumstances of early life which tend in no small degree to such a result. The moral education of the deaf and dumb must therefore be conducted with an especial care, and all the abnor-

<table>
<thead>
<tr>
<th>Congenital Deaf Cases</th>
<th>Acquired Deaf Cases</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>First cousins</td>
<td>60</td>
<td>5</td>
</tr>
<tr>
<td>Second cousins</td>
<td>60</td>
<td>3</td>
</tr>
<tr>
<td>Third cousins</td>
<td>21</td>
<td>1</td>
</tr>
<tr>
<td>Fourth cousins</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Fifth and sixth cousins</td>
<td>14</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>192</strong></td>
<td><strong>9</strong></td>
</tr>
</tbody>
</table>

enced peculiarities must be included among the causes which prej-udicially affect their dispositions, and overshadow attractive features of their character; and the kindly-intended interference of neighbours with the parental management often proves morally injurious to them. Their discernment of right and wrong is equal to that of other children; and hence, when neighbours unwisely seek to screen them from merited punishment, a spirit of insubordination is excited, and sullenness or passionateness is induced. It should therefore be the parents' utmost endeavour, when punishment is to be administered, to treat these children impartially. It is most desirable also that external circum-

ences should be as favourable to them as possible, and

everything calculated to pollute their uncultivated minds kept from their acute powers of observation.

Causes.—The causes assigned for congenital deafness are consanguineous marriages, hereditary transmission, weak constitutions of parents, scrofula, climate, and the ill-health of the mother at a certain period of life. There is necessarily difficulty in ascertaining the real cause of deafness. This difficulty has its ground in the unwillingness of parents to admit that their children were born deaf. Their deafness is often attributed to some infantile disease, though the defect is congenital. On the other hand, when they have lost the sense of hearing at an early age, they may be included among the congenitally deaf. But all institutions for the deaf and dumb contain instances which illustrate scientific investigations, and establish the position that such causes as those now adduced to induce and perpetuate the disease of deafness. In all cases of congenital deafness it will be found that there exists some disorganization of the organ of hearing itself, some obstruction in the internal ear, or some inflammation of the brain, whereby the vibrations of the ear are prevented from producing the required effect upon the internal parts of the ear, or from being communicated to the brain.

After-birth or acquired deafness occurs at all ages, and has its origin in such diseases as small-pox, measles, typhus, convulsions, palsy, hydrocephalus, and other affections of the brain, and "scarlatain, which more frequently than any other disease leaves the patient deaf, in consequence of the inflammatory state of the throat extending to the internal ear, causing suppuration and destruction of the delicate apparatus on which hearing depends; such being the case, especial attention should be directed during the course of the disease to the state of the throat, so as to prevent if possible the inflammation extending." Vaccination has been the means of greatly decreasing the cases of deafness; and doubtless, as sanitary laws become more general, the introduction of perfect sewerage, pure water, and good ventilation, will all tend to lessen the liability to those zymotic diseases upon which deafness supervenes. Amongst other causes of deafness are cold, and severe blows or falls upon the head. It has been ascertained that the proportion is about 60 per cent. congenitally deaf to 40 per cent. accidentally so; and the census returns for 1871 show that of the 1054 inmates of 12 institutions of England and Wales 63 per cent. were congenitally deaf. Consanguineous marriages are perhaps the most fertile source of deafness, which fact is established by the numerous cases of deaf children who are the offspring of first cousins. It is not only so in England, but in other countries of Europe and America. Dr Buxton says, "In an inquiry which I made some time ago, I found that about every tenth case of deafness resulted from the marriage of cousins." The Irish Commissioners' Report for 1871 says, "Too close consanguinity in the intermarriage of relatives, and also hereditary predisposition, have long been supposed to be causes of congenital deaf-mutenes." The results obtained by the census of 1871 tend to confirm these suppositions.

The following table from census returns for Ireland exhibits the amount of deaf-mutenes where consanguinity of parents existed:—
Thus we find that, in 201 instances of relationship between the parents of mates, 85 were in the degree of first cousins, 65 in that of second, 32 in that of third, 7 in that of fourth, and in 14 they were more remotely related.

Dr. Bonduin, at a meeting of the Academy of Sciences, Paris, noticed the following striking result of such unions:

"Two brothers in perfect health, and well constituted men, had married two sisters, their cousins-german. The elder brother had six children, one of whom was deaf and dumb. The other brother and his wife also had five children, the first, third, and fifth of whom were deaf and dumb. The second, fourth, and probably the sixth (an infant) are deaf and dumb."

The report of Dr. Eames of Louisville, Kentucky, to the American Medical Association on the subject of the influence of marriages of consanguinity on offspring and records the following results of 833 such marriages:

Of the 3942 children of those marriages 1134 were defective in one way or another, viz., deaf and dumb, 145; blind, 85; idiotic, 528, insane, 35, epileptic, 60; epileptic, 500, and deformed, 24, 858 died young; and the writer concludes by remarking, "I feel satisfied, however, that my researches prove the conclusion, that over 10 per cent. of the deaf and dumb are the issue of consanguineous marriages, and over 5 per cent. of the blind, and nearly 15 per cent. of the idiotic, in our State institutions for defective persons."

Another great cause of deafness is hereditary transmission. "It has been clearly ascertained," says Dr. Harvey (On the Ear), "that the most common cause is a strumous and malignant habit of body, generally hereditary."

The subjoined table from the census returns for Ireland in 1871 proves that deaf-mutism is often transmitted by hereditary taint or family peculiarity. The table is divided into two sections,—the first showing where the disease is transmitted by the father, the second by the mother.

**Mute relations on Father's side.**

<table>
<thead>
<tr>
<th>No of Mute Mates in each family</th>
<th>Grandfather, Grandmother</th>
<th>Great-Great-Grandfather</th>
<th>Great-Great-Grandmother</th>
<th>Great-Great-Great-Grandfather</th>
<th>Mother</th>
<th>Uncle</th>
<th>Aunt</th>
<th>Cousin</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td>5</td>
<td>12</td>
<td>8</td>
<td>50</td>
<td>93</td>
</tr>
<tr>
<td>Two</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>104</td>
</tr>
<tr>
<td>Three</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>113</td>
</tr>
<tr>
<td>Four</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>126</td>
</tr>
<tr>
<td>Five</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>139</td>
</tr>
</tbody>
</table>

**Mute relations on Mother's side.**

<table>
<thead>
<tr>
<th>No of Mute Mates in each family</th>
<th>Grandmother, Grandfather</th>
<th>Great-Great-Grandmother</th>
<th>Great-Great-Grandfather</th>
<th>Great-Great-Great-Grandfather</th>
<th>Uncle</th>
<th>Aunt</th>
<th>Cousin</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>2</td>
<td>3</td>
<td>9</td>
<td>6</td>
<td>12</td>
<td>33</td>
<td>67</td>
<td>114</td>
</tr>
<tr>
<td>Two</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>107</td>
</tr>
<tr>
<td>Three</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>108</td>
</tr>
<tr>
<td>Four</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>109</td>
</tr>
</tbody>
</table>

The Commissioners' Report is as follows:

"Although it has been shown that mutism is transmitted by hereditary taint, yet it is very seldom descends directly from the parent to the offspring, which is manifest from the following results of the inquiry made respecting the marriage state of the congenitally deaf. After a minute investigation of this subject, we find 115 instances, 77 males and 38 females, of the marriages of congenital deaf mates where either one or both parties were affected. In 81 instances we ascertained that only one of the parties was congenitally deaf, and that 704 children, none of whom were deaf and dumb, resulted from 47 such marriages; in the remaining 14 instances there was no issue. We find four instances of the marriage of a congenital deaf mute with an acquired deaf mate, from three of which 7 children resulted, one of whom was deaf and dumb. There were 18 instances of the intermarriage of persons both of whom were deaf and dumb, and from 12 of these marriages 44 children resulted, of whom only one was deaf and dumb, and another was deaf only. The grand-parents of the former on the mother's side, and a grand-uncle of the father's, were also deaf and dumb. Of 315 children resulting from 87 of the above-mentioned marriages, only two were deaf and dumb, and one deaf only. In a case of the intermarriage of congenital deaf mates, although the husband's parents were second cousins and the wife's also related, and her sister deaf and dumb, yet none of the 8 children resulting from the marriage were in any way affected.

The Principal of the New York Institution says, "We can show that it is much the commonest for the children of deaf and dumb parents to possess the families of which their parents are deprived, still, although deaf or dumb offspring may not be defective, they are likely to inherit that peculiar taint of constitution by which the disease will be transmitted to future generations, which is so often the case."

Mr. Turner, in a paper on Hereditary Deafness, gives the following table:

<table>
<thead>
<tr>
<th>Class</th>
<th>Parents</th>
<th>No. of Families</th>
<th>No. of Children</th>
<th>Total Def.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>One hearing and one congenitally deaf</td>
<td>30</td>
<td>15</td>
<td>77</td>
</tr>
<tr>
<td>2</td>
<td>One incidentally and one congenitally deaf</td>
<td>56</td>
<td>6</td>
<td>120</td>
</tr>
<tr>
<td>3</td>
<td>Both congenitally deaf</td>
<td>24</td>
<td>17</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>110</td>
<td>38</td>
<td>277</td>
</tr>
</tbody>
</table>

From this it appears that in 56 families with one parent a congenital deaf mute there were 218 children, of whom 21 were deaf and dumb, or about one-tenth of the whole. In the 24 families with both parents congenital deaf mates there were 57 children, of whom 17 were deaf and dumb, or about one-third of the whole. The proportion of deaf-mute children of parents both congenitally deaf is thus more than three times greater than of parents only one of whom is congenitally deaf.

The subjoined table shows the proportion of the families, constituted as above, who had deaf-mute children in them:

<table>
<thead>
<tr>
<th>Class</th>
<th>Parents</th>
<th>Fam.</th>
<th>Fam.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>One hearing and one congenitally deaf</td>
<td>30</td>
<td>One or more deaf</td>
</tr>
<tr>
<td></td>
<td>and dumb in 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>One incidentally and one congenitally deaf</td>
<td>56</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Both congenitally deaf</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>110</td>
<td>38</td>
</tr>
</tbody>
</table>

The proportion of families having one congenitally deaf parent, with at least one deaf-mute child, is about one-tenth of the whole, while the proportion of the families having both parents congenitally deaf with a deaf-mute child or children is more than one-third of the whole. The above tables show the amount of deafness transmitted by the marriage of one congenitally deaf with one hearing person. The cases of deafness resulting therefrom are only one-tenth of the whole, whereas those from the intermarriage of deaf mates are about one-third. Similar results could be obtained from records of many of the institutions, but from what has already been stated on this cause of deafness, it appears that, while there is sufficient reason to justify the prohibition of the intermarriage of deaf mates, the exceptional cases of deaf mute offspring as the result of unions of deaf mates with hearing persons would not justify interference in such marriages.

**History of Instruction.**—In early times, it was an opinion maintained, even by philosophers, that the education of the deaf and dumb was not possible. It was then believed that language could only be acquired through the medium of the ear. The couplet of Lucretius is well known—
Parents, influenced by this belief, allowed their children to grow up without culture. They were abandoned to themselves, and exiled from the community of rational beings. To such a culpable extent was this prejudice carried, that it has been the practice, in those countries to declare deaf and dumb children who remained at three years of age incapable of either hearing or speaking, and by the code of Justinian, it has been declared that children are incapable of civil acts. In France, the very birth of such children was accounted a sort of disgrace to the family from which they sprang, and the duties of humanity were deemed to extend no further in their behalf than to the maintenance of their animal existence, while they were carefully secluded from the eyes of the world either within the walls of the cloister or in some hidden asylum in the country. Abandoned thus early to their fate, and regarded as little better than idiots, it is not surprising that their future success should have been such as might seem to justify the erroneous views which had prompted this un­generous treatment. The progress in the art of instructing the deaf and dumb was in consequence greatly retarded; attempts to instruct them were scarcely known, and no school was established till the middle of the 18th century. In the 4th century, St Augustine, influenced by the dictum of Aristotle, expresses his unfavourable opinion respecting their ability to obtain any religious knowledge, remarking, "that deafness from birth makes faith impossible, since he who is born deaf can neither hear the word nor learn to read it." But in this enlightened age it has been fully proved that the neglect and forgetfulness to which these outcasts were formerly consigned were founded on very mistaken notions of their mental capacities.

The first instance of a deaf mute being instructed is mentioned by Bede in 685. No other case is met with till some centuries afterwards, Rodolphus Agricola, of Heidelberg, who was born in 1442, and died in 1485, makes mention in his De Inventione Dialectica, of an educated deaf mute; but this instance, and probably others, were discredited on the ground of their impossibility. Jerome Cardan, a native of Pavia, born in 1501, took a more philosophical view of the subject, and says, "Writing is associated with speech, and remains with those lost, but written characters and ideas may be connected without the intervention of sounds," from which he further argues that "the instruction of the deaf is difficult, but it is possible." It was no doubt this enlightened view that gave to the education of the deaf and dumb its first and greatest impulse. A Spanish Benedictine monk of the convent of Salagun in Spain, named Petry de Fonse, who was born in Valladolid in 1520 and died in 1584, is the first person who is recorded to have instructed the deaf and dumb and taught them to speak. He was fifty-six years old when Jerome Cardan died, and he had no doubt, from his association with Cardan, imbibed his principles. He was, however, no more a prophet to his generation than was probable that the substance of his method is contained in a book of Bonet, secretary to the constable of Castile, printed at Madrid in 1620 under the title of Reducciones de las letras y artes para enseñar a hablar a los mudos. In the turn of Bonet's the teaching of the deaf and dumb was becoming more general and was entered upon by several persons, both in Italy and in England. Dr John Bulwer, an English physician, and Dr Wallis, professor of mathematics in the university of Oxford, were both engaged in the work in England about the same time, though it is not accurately known to whom the honour of being its prime mover is due. The former published a treatise on the education of the deaf and dumb in 1648, several years before Dr Wallis's valuable and able work had appeared. In the year 1669, some years after Dr Wallis's writings and practice of instructing the deaf and dumb had been known, Dr W. Holder, rector of Bletchington, published a work entitled Elements of Speech, with an Appendix concerning Persons Deaf and Dumb; in 1670 George Sibocote issued a Treatise concerning those who are Born Deaf and Dumb; and in the year 1690 George Dalgaro, a native of Aberdeen, published an able and philosophical work, under the title of Didascalopolus, or the Deaf and Dumb Man's Tutor, which was reprinted some years ago by the Mantland Club.

In France the work of teaching the deaf and dumb was late in receiving the attention it deserved, in consequence of the still prevalent doubt as to its practicability, although many instances of success in other countries were generally known. It was not till about the middle of the 17th century that the subject was taken up with any interest. Vanin, a Father of the Christian Doctrine, made some attempts to alleviate the condition of the deaf and dumb, but his work was cut short by death. After him came Ernaud, Rodriguez Pereira, the Abbé Deschamps, and the Abbé de l'Épée. In Silesia, at the beginning of the 18th century, W. Kerger established his method on the principles of John C. Amman; and in 1718 George Raphel, a German, and contemporary with Kerger, published the system he had carried out in the education of three deaf mutes in his own family. All this interesting work had been accomplished before any public school for the deaf and dumb had been established; and it was not till 1760 that Abbé de l'Épée started the first school in Paris. About the same time Thomas Braidwood opened a school in Edinburgh; and in 1778 Heinicke in Germany founded another at Leipsic under the patronage of the Government, where he pursued the system of articulation and lip reading which forms the basis of instruction in the German schools of the present day. Thomas Braidwood made himself famous by his remarkable success. He was visited by Dr Johnson when on his tour to the Hobbides, who expressed himself highly gratified with the success in what he considered a great philosophical curiosity. In 1783 Braidwood left Edinburgh and opened a school at Hackney, London, where he continued his arduous duties till 1806, when he died. Two of his sons became instructors of the deaf and dumb. A school was opened in Edinburgh by one of them in 1810, and the other started a school at Birmingham in 1825. In the year 1792 the first public school in Great Britain for the gratuitous education of the deaf and dumb was opened in Bermondsey, London, of which Dr Watson, the nephew of Thomas Braidwood, was for thirty-seven years the head instructor. Since the above date (1792) schools have been established in many of the principal towns of Europe and America.

Methods of Instruction.—All the institutions and schools for the education of the deaf and dumb employ one or other
of the two following methods—(1) that in which the sign language and manual alphabet form the basis of instruction, with articulation and lip reading to a greater or less extent, but, as a rule, only for the semi-mute, semi-deaf, and those of the class called good-deaf, of good capacities, and who show an aptitude for it; and (2) that in which articulation and lip reading form the basis of instruction, and the sign language and the manual alphabet are used more or less as a means to the end. The former is the more general, and is carried out in all the schools of the United Kingdom (although in the London Asylum articulation and lip reading are prosedely and systematically taught to every pupil), in America, and in some of the Continental schools. The latter is the one chiefly employed in the German and Austrailian schools, and is followed in one or two private schools in London.

The signs in use in all schools are of two kinds—the natural, and the conventional or arbitrary. The former are those with which all deaf mutes are familiar before coming to school, and which they use in ordinary intercourse with their friends. The latter are chosen and systematized by the teachers of the several schools, and, in combination with the natural signs, are employed to convey ideas of a complex nature. Every action, the visible part of which can be imitated by gesture, admits easily of being so expressed, as the action of eating by lifting the hand to the mouth followed by the motion of the palms, and of sleeping by closing the eyes and reclining the head; the expression of different passions, of approbation or disapprobation, of surprise, curiosity, &c, may all be signified very intelligibly by modifications of the countenance. "It is in this simple manner," observes Dr. Watson, "that two or more deaf persons are enabled to hold instant converse with each other, though brought together from the most distant parts.

Thus far these signs may be termed natural, but the naturally deaf do not stop with this language of pantomime: They are fortunate enough to meet with attentive companions, especially where two or more deaf persons happen to be brought up together, it is astonishing how approaches they will make towards the construction of an artificial language. By an arbitrary sign fixed by common consent, or accidentally hit upon, they will designate a person, place, or thing, and the sign is ever after used by them as a proper name. It is impossible to give a verbal description of those signs, because they are as various as the fancies and circumstances of their inventors. Yet being gaunt on the parent stock of natural and universal signs, they may in some measure be regarded as different dialects of the same language. But since it would be impossible by means of natural signs alone to convey to the minds of the deaf and dumb ideas of a complex nature, recourse must be had to that system of signs known as conventional or arbitrary. These signs have been extended and systematized on natural and philosophical principles by the several teachers of the deaf and dumb, and they differ in degree in all schools. It would be impracticable to maintain the same system of signs throughout, even should such be desirable, but it is of the utmost importance that those in use in each school should be so cultivated as to prevent any confusion of ideas by the improper use of them. It is by their aid chiefly that all instruction is carried on, and, as used by nascent mutes for the deaf and dumb, they are remarkably serviceable, there being always to be found, in an assembly of deaf mutes, many whose minds cannot be reached by any other means. Attempts are often made in the institutions for the deaf and dumb to dispense with signs, and to use the manual alphabet alone, but the latter are carried by the pupils have acquired a certain facility in language. Although this would prove of immense educational advantage, attachment to the natural language of signs is so strong that it has always been found as impracticable to make the change as to substitute articulation and lip reading. Signs to the educated deaf and dumb should be as crutches to the halt—to be used only when occasion requires—otherwise their constant use will tend to enable rather than strengthen the intellect. In the sixth report of the American Asylum at Hartford, Connecticut, the following is given as an answer of a deaf mute to the question, "Which do you consider preferable—the language of speech or of signs?"

"I consider to prefer the language of signs best of it, because the language of signs is capable of giving the elucidation and understanding well. I have found them to give me a quick, without having the troubles of the voice. Therefore the language of signs is more still and calm than the language of speech, which is full of foolhardiness and trouble."

The Abbé de l'Épée, to whose teachers of mutes are greatly indebted for the methodical and ingenious system of signs, altogether mustook their function as a means of educating the deaf and dumb and in consequence his method failed utterly. He gave to each word its peculiar and appropriate gesture in the natural order of the signs, and by the invention of these gestures he succeeded in enabling his pupils to transcribe whole pages of the most abstract disquisitions. The substance and design of these, however, were not theirs but his own, and, of course, the gestures which they had mechanically associated with certain characters, conveyed to them no notion of the real signification of those characters. Notwithstanding the radical and glaring defects of De l'Épée's method, which could have had no utility to those who followed it, the ostentatious display he made of his system excited the astonishment and applause of a host of spectators; and, being seconded by the impulse of his religious zeal and benevolent character, it soon raised him to a high degree of reputation. His fame spread all over Europe, and his lectures and exhibitions attracted everywhere crowds of enthusiastic admirers. Some, however, saw through the delusion. At a public exhibition of the pupils of the Abbé Storck, who were taught according to this method at Vienna, Nicolai, an Academician of Berlin, proposed to the Abbé to require one of his pupils to describe in writing the action he was about to perform. The challenge being accepted, the Academician struck his breast with his hand, upon which the deaf and dumb boy wrote the words, "hand, breast." Nicolai withdrew satisfied with this proof of total failure. It was evident, notwithstanding their apparent knowledge and their quickness in writing down any question together with its answer, both had been equally dictated by their master, in the same language of gesture, but without any corresponding ideas or the exertion of any intellectual faculty, except that of memory. They were utterly incapable of composing a single sentence of their own accord, and it was found, accordingly, that their spontaneous answers to questions were limited to the moneystables yes and no, of which it is even doubtful whether they fully understood the meaning. The proper method by which the pupils' knowledge of the construction of language can be tested is by dictating a lesson in the sign language in the manner in which deaf mutes themselves use it, without any regard to logical or grammatical distinctions. Most pupils after a few months' instruction will be able to write down a very fair piece of composition if dictated by the method as employed by the Abbé de l'Épée and Storck, but without understanding its meaning. The following instance will at once explain the way in which the sign language is employed by the teachers, and used amongst the deaf and dumb themselves—
DEAF AND DUMB

Let it be supposed that a girl had been seen by a deaf mute child to drop a cup of milk which she was carrying home. He would relate the incident in the following order of sign words. Saw-I-girl-walk-cup-milk-carry-homes-drop. This mode of dictating is the only sure road to the acquisition of language by those who have nothing but the natural language of gesture and feature to assist them.

The value of the language of signs is well expressed by the principal of the Ohio Institution for the Deaf and Dumb, who says —

"The use of good scaffolding must attend the erection of every building. As scaffolding in architecture so is the sign language in deaf mute education, and only tyros in architecture or education would dispense with either. The riper the experience the deeper the conviction comes of the necessity and usefulness of the sign language, and in its use we find the corner-stones of all deaf mute institutions. The cultivation of it and its effective use is the only peculiar, although not the chief qualification of the teacher. He will teach written language by the sign, styling and the latter as soon as the ready use of "he former has been secured. It is not necessary to descant upon the beauty, the grace, or the power of the sign language. The mute has no other, and the teacher must use and improve it as best he may."

The first lesson in which the pupils are instructed on their entrance into school is the mode of visible communication known as the finger or manual alphabet. There are two kinds of this,—the double-handed alphabet, where the letters are expressed by the dispositions of the fingers of both hands, and the single-handed, in which the letters are formed with the fingers of one hand. It is supposed that the former was derived from a finger-alphabet which appeared in a work by Dalgarne; and the latter is said to have been invented in Spain, and appears to have been published in a work by Bonet to which the Abbé de l'Epée was much indebted.

Talking with the fingers is an art easily acquired and retained, or recovered if lost, and it furnishes a ready substitute for pen or pencil; but it must not be forgotten by those familiar with it that the extent to which the deaf mute will be able to understand any communication will depend entirely upon the state of his education, or upon his knowledge of language. The deaf and dumb when properly instructed converse with the utmost rapidity by this method; habit enables them to follow with the eye motions which to others would be too rapid for observation. They readily catch at the meaning of a word or question before it is half spelt.

Articulation.—Another very important branch of the education of the deaf and dumb is that system by which deaf mutes are taught to speak and to understand the speech of others by merely watching the motion of the vocal organs. This method is by no means novel, as it has long been practised in some of the schools in England, and the earliest attempts to teach the deaf and dumb to speak appear to have been as successful as those in modern times. We learn from the Venerable Bede's Ecclesiastical History (quoted by the Abbé Carton in his Annual of the Deaf and Dumb and Blind) that a deaf man was taught to pronounce words and sentences by John, bishop of Hagulstadt (Hexham), in the year 685; and from that time we meet with only isolated cases, till the latter part of the 18th century, when Samuel Heinicke established a school where this system formed the basis of instruction. It would at first sight appear scarcely credible that a person, without the guidance of the sense of hearing, would be able, merely by watching the position and actions of the organs of the voice, to utter articulate sounds, with any tolerable perfection. Experience, however, has shown that this accomplishment, though laborious and tedious of acquisition, is not attended with extreme difficulty. Great patience, perseverance, and kindness are qualifications necessary on the part of the teacher to ensure success in ordinary cases, and the degree of success will greatly depend upon the number of children among whom the teacher has to divide his attention. A wide difference must ever be perceptible between the speech of the deaf and those who hear. This artificial speech is laborious and constrained.

It frequently conveys the idea of pain as well as effort, and as it cannot be regulated by the ear of the speaker, it is often too loud, and generally monotonous, harsh and discordant. It is often from this cause scarcely intelligible except to those who are accustomed to its tones. The
system of articulation and lip reading prevails in the German and other Continental schools, where this art has been cultivated with greater success than in England, which must be attributed to the adaptability of the German language to this peculiar mode of acquiring speech, the decision of this question, as far as it concerns any particular individual, must, however, depend in a great measure on peculiar circumstances, such as condition in life and future destination, &c. Children congenitally deaf, of good capacity, with a well-tuned voice, can make surprising progress in the hands of private tutors, but the limited success which has attended this method of instruction with numbers has not induced teachers to introduce it generally into large institutions, but rather to restrict it to special cases. Most of the German teachers consider that articulation is necessary for the acquisition of thought, and can be successfully taught to the majority of the deaf and dumb; but most teachers of experience in England hold quite the opposite opinion, and teach it only to the semi-deaf and semi-dumb. The subject continues to be much disputed, and the question, whether or not it should form a part of the course of the education of the deaf and dumb, and, if so, to what extent, is still keenly discussed. The American institutions have sent over to Europe from time to time some of their most distinguished instructors to investigate the methods carried on in the English and Continental schools. They made most minute examinations of the different systems, and were somewhat disappointed to find that the German system so-called did not possess such advantages over theirs, or the French system, as they had been led to expect. Mr Gallaudet, in his report to the board of directors of the Columbus Institution for the Deaf and Dumb, says:—"Nothing in my foreign investigations has led me to question the character of the foundation on which the system of instruction pursued in our American institutions is based. It is plainly evident, from what we see in the articulating schools of Europe and from the candid opinions of the best instructors, that oral language cannot, in the fullest sense of the term, be mastered by a majority of deaf mutes." The following is the opinion of the Rev. George Day:—"As a regular part of a system of public instruction, its introduction into our institutions, I am persuaded, would be a serious misfortune." Mr Hawkins (for many years a teacher in the London school), who may be said, in this connection, to represent the consensus of English authorities, says:—"Scarcey more than one in thirty attains anything approaching success." The experience of Dr Watson, for many years principal of the London Asylum, is decidedly in favour of its utility. In support of his opinion he states the following argument, which must doubtless be allowed to have some weight:—

"The more numerous are the means of observation, the more perfect will be the recollection, or, in other terms, the more frequent the recurrence of words and their corresponding ideas to the mind. Thus, persons who can hear, speak, read, and write retain a discourse much better, and have far greater facility in expressing themselves, than those who have only two of these faculties, that is, articulate persons, who can hear and speak, but who cannot read or write. Now, as deaf and dumb persons educated without articulation can only have two of the means, viz., the third and the fourth, that is, the impressions made upon the eye by characters and the action of the hand in writing, can it be questioned that it renders them an essential service by adding the actions of the organs of speech, a very powerful auxiliary, since by it words become, as it were, a part of ourselves, and more immediately affect us? In lessening the pronunciation of letters, a very important operation is going on in the mind of a deaf person, namely, the association and understanding of the figures or combinations of written or printed characters with certain movements or actions of the organs of speech. The very habit of regarding the one as the representative of the other paves the way for successful combinations of those actions or characters, as the sign of things or ideas—that is, significant words, written or articulate. We who hear consider words chiefly as sound; the deaf who have learned to speak consider them rather as actions proceeding from themselves. And this gyres language to them a sort of tangible property, which is of vast importance both as respects its retention in the memory, and one of its most important uses, the extraction of ideas in their own minds. On this account the time, the labour, and attention, necessary to articulate speech by those who are dumb through want of hearing, would be well bestowed, even if their speech were not intelligible to others."

In America oral teaching is now receiving much attention. It has been introduced into several of the existing institutions, and two or three schools have been established in which the German system is exclusively carried out, and in order to facilitate the acquisition of articulate speech, the ingenious method called "Visible Speech," invented by Mr Melville Bell, has been introduced. In England, also, there are several ardent advocates of the oral system.

Time of School Attendance.—After the foregoing sketch and criticism of the different methods which have been adopted for the education of the deaf and dumb, it is natural to inquire what general end in their education is proposed by teachers, and what principal aims in conformity with that end should be regarded. Obviously the fundamental object should be to qualify the pupils to hold ready communication with persons who, having the faculties of hearing and speech, employ the current language of the country for the purposes of mutual intercourse. They must above all things be taught the use of ordinary language, both as an instrument for expressing their own thoughts and for understanding those of others. This qualification, it is evident, is absolutely necessary to their becoming members of that community from which by nature they would have been excluded, and to which it is our chief aim to restore them. Teachers are not agreed as to the age at which the deaf and dumb should commence their education with the greatest benefit, nor yet as to the term required for school attendance. It is the opinion of some that infant schools for the deaf and dumb would prove of immense advantage in compensating for the extra length of time requisite to acquire anything like a perfect knowledge of the English language, but others are strongly opposed to these for social, physical, and intellectual reasons,—socially, as it tends to alienate the children from their parents; physically, as they are out of the reach of delicate constitutions; they require the years of childhood to be invigorated, and so to be fitted to undergo the strain of a regular and systematic course of instruction; and intellectually, as it has been found by experience, that children of an early age have not that power of comprehension or memory to enable them to advance with satisfaction. Doubtless, they would benefit somewhat by coming to a school for the deaf and dumb for a short time daily; but as the deaf-mute population is so scattered, very few would be able to avail themselves of such a privilege. The only available remedy would be their attendance at ordinary schools for a stated time daily, where they would be disciplined and taught—the girls to sew, knit, and write, and the boys to write and draw. By this suggestion it is not meant to affirm the possibility of educating deaf mutes along with hearing children. The plan has been tried but has not been successful. The constant observation of the deaf mutes of the superiority of others over them tends to dishearten and depress them, and as they are at
all times too apt to be discouraged by the consciousness of
their own defect, it should be the teacher's duty cheerfully
to stimulate and encourage them to advancement.1

An infant school was formed in connection with the
Manchester Institution for the deaf and dumb some years
ago, but from the report for 1876 it appears that there were
close to two children under the age of seven, out of a total of
149 pupils, in the two departments. Most of the institu-
tions admit children from seven to nine years of age, and
in the opinion of teachers of experience that at that age it
is most suitable to commence instruction. Still, before
they are eligible for an institution of the deaf and dumb,
much may and ought to be done by the parents for their
improvement.

The first and primary aim of the teacher is to get at the
minds of the pupils, and for this end it is of immense
advantage that they should be brought up together, so that
they may acquire and maintain the language of signs. The
acquisition enables them to convey to one another much
and varied information, which proves of great service in the
hands of the teacher in the class-room, and further, through
this intercommunication the influence of example operates,
with due force in stimulating them to intellectual exertions.

The length of time required at school for the education
of the deaf and dumb must be determined by the capacities
of the pupils, and perhaps even more by their position
in life. Of course, they require a much longer time than
hearing children to compensate for their deprivation. Still
those who have to begin to earn their daily bread by the
labour of their hands at about the age of fourteen (if
good capacity) leave the school with a store of varied
and useful knowledge. They are able to understand
directions given to them, to hold intercourse with others,
to express their opinions on ordinary affairs—in short,
they are raised from a wretched and forlorn
state to stimulate

1 See school only, namely, Donaldson's Hospital in Edinburgh,
are the deaf and dumb brought together with hearing children,
but also in general practice to instruct them in
the same class-room. The benefit derived by the deaf and dumb
from such a system is very slight in an educational point of view,
but something of great advantage, as it draws them out of that
state to which they are naturally so prone, and fits them to hold free
and ready intercourse with strangers in after life; and besides, the associa-
tion materially tends to spread the mode of deaf-mute
communication throughout the country, as the hearing children learn to
communicate freely with them.

there is a diversity of occupation. We have bakers, blacksmiths,
ironfounders, bricklayers, brickmakers, brush-
makers, cabinetmakers, carpenters, carvers or wood work, scissor-
makers, compositors, cooper, cooper-attachers, cutlers, en-
gravers on wood and metal. From polishers, painters, gilders,
glass writers and stainers, harness makers, saddlers, harnessers, japanners, jewellers, law writers, optical and philosophical
instrument makers, pattern designers, print and map colourers,
printers both lithographic and letterpress, turners, typefounders,
watch-dial painters, wire drawers, &c. We also find artists—lith-
graphists, photographers, heraldb.—and some in the highest branches
both in oil and water colours; also a sculptor of great ability who
produced a beautiful composition in competition for the Wellington
memorial prize, who also once won a gold medal, and who has most satisfactorily executed statues of Wellington, Peel,
Baglan, Havelock, &c. There are, besides, two heraldic painters,
who have studied their own, and are amongst the best of their art
in London, with others who are rising to great prominence. Two
of the artists in oil, although but young and present students, have
executed pictures which have been accepted by the British Insti-
tution, the Suffolk Academy, and in one instance by the Royal
Academy. In more intellectual occupations we find several gentle-
men in the civil service, respecting one of whom, who has gained a
superior position in his office, it has been remarked to us by some
whose duties bring them into contact with him, 'that notwith-
standing his affliction they can do business better with him than
any other clerk in the establishment.' There is a young gentleman
making himself noted as an entomologist; some are teachers of the
deaf and dumb, occasionally even principals of institutions, and
the highest instance we know of is a barrister, not a pleader of course,
but who is eminent as a conveyancer. In the employment of
females there is not so much variety; some are engaged in domestic
work, others are artificial flowers, bookfolders, bookbinders, hammer-
drawers, cigar makers, corset makers, dress and mantle makers,
fringe and tassel makers, handweavers, muslin workers, milliners,
sewing machinists, straw bonnet makers, tailors, &c. There are
several who are now competent to remove.

OCCUPATIONS.—Most of the deaf and dumb soon after
leaving school are put to some trade. They will be found
to be engaged in all kinds of employment except those to
which hearing and speech are indispensable. The depriva-
tion of hearing is no barrier to learning most trades, and
the deaf and dumb acquire them with the same ease as others.
As a rule, they are very steady, and apply themselves with assiduity to
their work; for while the attention of those who can hear is
often distracted in the workshop, they steadily keep to
their task, as they well know that talking implies for them
cessation from labour. There is at times a little difficulty
in getting employers for them, as they require more attention
to be initiated into their trades.

The following extract from an interesting work on
Deaf and Dumb by the Rev. S. Smith enumerates many of
the trades in which they are engaged:—

"Deaf and dumb soldiers and policemen are not existent; there
is however a true volunteer, whose father being an old soldier
drilled him so well that he is able to join in general practice.

Amongst the males, besides various labouring employments, the
trades of shoemaking and tailoring predominate, but beyond these

2 Among those who passed the recent Cambridge Local Examinations
with honours in classics and mathematics was a deaf-mute lad under 16
years of age, named Farrar.

3 In the recent examinations of deaf and dumb in England and Wales and
Scotland.
generally known, the increased duke of Gloucester that be absolutely building since its foundation 4094 children have been admitted. In 1862 a branch was started at Margate, and after twelve years’ experience the committee of management were influenzae to erect a permanent building for the accommodation of 150 children. It was formally opened by the Prince of Wales on the 19th of July 1876, with Mr R. Elliott as head master. The asylum, with the branch at Margate, is supported by voluntary contributions, legacies, donations, and dividends from stock. The average income is about £12,000 a year. There are about 317 pupils in attendance, who come from all parts of the kingdom. The ages of admission are 5 to 115, and the children are elected by votes of the subscribers, and, with a view to assist that class of the deaf and dumb whose friends are able to pay for their board, the committee receive children upon the payment of £25 per annum. Those children whose parents or guardians are unable to put them to some useful trade on leaving school are apprenticed by the charity. Since 1811 the number of children apprenticed has been 1515, and the total amount of £14,632, 16s.

Various institutions for similar objects have been formed on the Continent. The asylum for the deaf and dumb at Paris, which was formerly under the management of the Abbé Sicard, has for its object only to enable the pupils to communicate their ideas and to form the understanding, but also to qualify them to earn their subsistence. On quitting the asylum they are all capable of following a trade or profession. Their apprenticeship begins on their first entering the institution, and is terminated when their education is finished.

Institutions, formed more or less upon the model of that at Paris, have been established in Portugal, Spain, Italy, Switzerland, Baden, Wurttemberg, Bavaria, Austria, Saxony, Hesse-Cassel, Nassau, Hanover, Brunswick, the Free Towns of Germany, Belgium, Holland, Denmark, Sweden, Russia, Poland, the United States of America, Canada, Mexico, and Bengal, to say nothing of those in Great Britain and France. The American annuals of 1873 give us 33 American institutions for the education of the deaf and dumb, containing a total of 4253 pupils—namely, 2395 males and 1858 females, 378 of whom are semi-mutes. The latter number includes all those who have acquired language through the ear. In Canada there are 4 institutions with about 92 pupils, of whom 220 are males and 73 females. Out of this number 17 are semi-mutes. The first institution for the education of deaf mutes in America was opened on the 15th April 1817. The circumstances which led to its establishment are as follows:

A deaf-mute little girl in the family of Dr Cogswell, an eminent physician in Hartford city, attracting some attention, it was soon afterwards found that there were other deaf mutes in the country. It was decided to send some one abroad to acquire the art of educating them, and to establish a school for this purpose funds were raised, and the Rev. F. H. Gallaudet, D.D., was selected for this work. He left the United States, May 15, 1816, to execute this mission intimated to him. The Institution was incorporated by the Connecticut Legislature in May 1816, under the name of the Connecticut Institution for the Education of the Deaf and Dumb.

Mr Gallaudet returned to America in August 22 of the same year, accompanied by Mr L. Clerc, a deaf-mute pupil of the Abbé Sicard. They immediately commenced collecting funds to start the school. The enterprise excited general interest, and individuals and churches contributed liberally. The sum of $12,000 was raised in the course of a few months, $5600 having been obtained in Massachusetts, above $2000 of which was collected in the city of Boston. After this school had been founded, the need of other schools was felt, and the New York Institution was opened in 1818, that in Pennsylvania in 1822, the one in Kentucky in 1823, Ohio school in 1827, and others followed till the number reached to 35, the last of which, a day school, was opened at Cleveland, Ohio, in 1871.
Table II. shows the number of deaf and dumb persons in the United Kingdom in 1871, with the proportion which they bear to the whole population.

<table>
<thead>
<tr>
<th>Country</th>
<th>Date of Enumeration</th>
<th>Number of Deaf and Dumb</th>
<th>Population</th>
<th>Proportion of Deaf and Dumb to Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Europe</td>
<td>1871</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>England and Wales</td>
<td>1871</td>
<td>27,715,964</td>
<td></td>
<td>1 in 800</td>
</tr>
<tr>
<td>Scotland</td>
<td>1871</td>
<td>3,768,018</td>
<td></td>
<td>1 in 600</td>
</tr>
<tr>
<td>Ireland</td>
<td>1871</td>
<td>2,400,959</td>
<td></td>
<td>1 in 600</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>33,885,121</td>
<td></td>
<td>1 in 600</td>
</tr>
</tbody>
</table>

These figures afford an indication that causes are at work which are diminishing the extent of deaf-mutism in the country; such as direct sanitary improvements, general attention to the laws of health, and more skilful treatment of the diseases which result in deafness. Of the 11,518 deaf mutes in England and Wales in 1871 (including those described as dumb) 6093 are males and 5256 are females. In Scotland, out of the 2087 deaf mutes, 1153 are males and 944 females, of whom 1016 were ascertained to have been so from birth, while 2001 became so after life from various causes. The number of deaf and dumb persons in Ireland is 5554, viz., in Leinster, 1318; Munster, 1500; Connaught, 882; and Ulster, 1764.

The instances of persons in the melancholy condition of being deaf and dumb and blind are more numerous than might be supposed; for the congenitally deaf are in a decrementary period, which shows an absolute decrease of 1075 deaf mutes, viz., 718 persons in England and Wales, 245 in Scotland, 99 in Ireland, and 51 in the islands of the British seas.

The above, compared with the returns of the census of 1861, with an increase of population of 24 million during that decrementary period, will show an absolute decrease of 1075 deaf mutes, viz., 718 persons in England and Wales, 245 in Scotland, 99 in Ireland, and 51 in the islands of the British seas.

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</tr>
</tbody>
</table>

DEAFNESS. See Ear.

DEÁK, FRANZ (1803–1870), an Hungarian statesman, was born on October 17, 1803, at Kehida, in the comitat of Szalad. He sprang from an old noble family, of which he was the last descendant. Having studied law at the academy of Raab, he practised as an advocate in Szalad, and soon became a prominent figure at the seatings of the comitat. He represented Szalad in the Diet, which met at Pressburg in 1832 and lasted till 1838. By his earnestness and practical sagacity he made so deep an impression that he was in a short time recognized as leader of the opposition. The object of his policy was, on the one hand, to resist the encroachments of the central Government at Vienna on the rights of his country, and on the other to remove abuses which then made Hungary one of the most backward nations in Europe. He again sat for Szalad in the Diet of 1839–40, and by skilful management effected a temporary reconciliation between the Imperial Government and the Reform party, of which he was the head. He gave deep offence, however, by the vigour with which he denounced the exemption of Hungarian nobles from taxation, as well as other injurious survivals of the Middle Ages; and when elected in 1843 he received such definite instructions from the constituency to vote in a reactionary sense that he declined to accept his seat. At a second election the Liberals exerted themselves so energetically that he was again appointed; but, on the ground that violence had been used in connection with his candidature, he once more refused to enter the Diet. For some years he lived as a private citizen; but he was everywhere regarded as the most influential Hungarian politician, and his party took no important step without consulting him. A project for a penal code which he drew up about this time was admitted in Germany, France, and England to be one of the most enlightened ever conceived. The excitement of 1843 caused the first symptoms of the disease of the heart which he ultimately died; and during the rest of his life he always suffered more or less from ill health. On this account he could not enter the Diet of 1847; but next year, when revolutionary forces threatened to break up the empire, he was persuaded to take a seat vacated for him by one of the members for Szalad.

The emperor, alarmed by the dangers which surrounded him on every side, conceded in a number of measures, afterwards known as "the laws of 1848," every important demand Deák had ever made. The first independent Hungarian Cabinet, with Count Batthyany as president, was formed, and the ministry of justice was intrusted to Deák. In this office, during the few months in which he worked indefatigably; and he intended completely to reorganize legal administration. His plans, however, were
DEA—DEA

disturbed by the agitation of which Kossuth was the centre, and which aimed at changes of a more extreme character than he approved. He desired to maintain the relations of Austria and Hungary, and exercised his whole influence in favour of a good understanding between the two countries, and Events decided against him, for Kossuth rose to power and began the war in the course of which the Habsburg dynasty was formally deposed. Deak resigned his portfolio, and appeared in connection with the subsequent struggle only as one of the deputation which, on the approach of the Austrian army to Buda-Pesth, went to negotiate with Prince Windischgrätz. When the war was over, Deak was offered the post of Judex Curiae; but he insisted that the laws of 1848 were still in force, and would have nothing to do with any system of government in which they were ignored. On the other hand, he disconcerted various proposals, urging that the legal rights of the land could be secured only by legal means.

Hungary suffered deeply from the reaction which followed the revolutionary period, and it was clear that the only answer to a favourable opportunity to throw off the imperial yoke. The disasters sustained by Austria in the Italian war of 1859 suggested to the emperor the necessity of a change of policy, and the result was that in 1861 the Diet again met. This time Deak appeared as member for Pesth, which henceforth returned him at every election till his death. The Moderate party rallied round him, and after much discussion the address to the emperor drawn up by him was adopted. In this the Diet took its stand on the laws of 1848, and demanded the appointment of a Hungarian ministry; but at Vienna they were not prepared to give way so far. The imperial request was very hostile to the town, and the Diet was speedily dissolved. In 1865 fresh negotiations were begun, and they were powerfully promoted by a series of letters in the Pesti Napló, setting forth Deak's ideas as to the proper bases of reconciliation. Towards the end of 1865 the Diet was opened by the emperor in person. About six months afterwards it was hastily closed because of the approaching war between Austria and Prussia; but it reassembled on November 19, 1866, when Austria had been utterly defeated and seemed on the brink of ruin. The Radical party wished to take advantage of the general confusion by exacting terms to which the Austrian Government would never before have consented; but Deak maintained his former position, desiring no more than that the system which he considered the only legal one should be forced. His influence over that the nation prevailed; and he had the satisfaction of seeing Count Andrassy appointed president of an Hungarian cabinet and the emperor and empress crowned as king and queen of Hungary. The establishment of the dual system, which enabled the Austro-Hungarian monarchy to enter upon a new career after terrible humiliations and losses, was due to the efforts of Deak more than to any other cause, and the fact was gratefully acknowledged both by the mass of his countrymen and by the emperor.

For some years the Deak party continued to reign powerful in the Diet; but the state of his health rendered it impossible for him to do much more than deliver occasional speeches on subjects of unusual interest. His last speech in the summer of 1873, was on the relations of church and state; and he proclaimed himself in favour of the American system—"a free church in a free state." Before his death his party lost its hold over the nation; and in 1875 Tisza, a man of more advanced opinions, was called to the head of the Government. Deak died on January 29, 1876, at Buda-Pesth, after a long and painful illness. His death was regarded as a national calamity, and he was buried at the cost of the state amid manifestations of universal grief.

Hungary has produced no other statesman of equal distinction. He approached closely to the type which is supposed to be peculiarly English, holding fast vital principles, but always ready to accede to a compromise on matters of secondary moment. Intensely opposed to revolution, he was absolutely fearless when sure that he was standing on lawful ground, and pursued the political ideal he had formed with a persistence which has been rarely equalled. In youth his style as an orator was passionate and florid, but he ultimately became calm and deliberate, carrying conviction by command of facts, logical arrangement of ideas, and lucid statement. At all periods of his career he conveyed the impression of absolute sincerity and devotion to high and unselfish aims. He was of a genial disposition, remarkably fond of children, and with a gift of ready humour which made him as great a favourite in society as in parliament.

DEAL, a municipal and parliamentary borough and market town of England, in the county of Kent, eight miles N.N.E. of Dover and five miles by rail E.S.E. of Sandwich. It consists of three divisions—Lower Deal, which is the most important, on the coast; Middle Deal, and, about a mile inland, Upper Deal. Though largely frequented as a sea-bathing place, the town derives its importance mainly from its vicinity to the Downs, a fine anchorage about eight miles long and six miles wide between the shore and the Goodwin Sands, in which large fleets of wind-bound vessels may lie in safety. The town, consequently consists largely in the supply of provision and naval stores, though boat-building and a few other industries are carried on. The Deal pilots, limited by statute to the number of 56, are famous for their skill and daring.

The public buildings in the town the most remarkable are St. Leonard's Church in Upper Deal, which dates from the Norman period; the Baptist chapel in Lower Deal, founded by Captain Taverner, governor of Deal Castle, in 1663; the Deal and Walmer Institute, established in 1864, the military and naval hospital, and the barracks, which date from 1795. The site of the old navy yard is now occupied by villas; and the esplanade has been improved by the construction of a promenade pier. At the south end of the town is Deal Castle, erected by Henry VIII., and about a mile to the east is Sandown Castle, which has its origin to the same monarch, and is of interest as the prison in which Colonel Hutchinson died in 1654. Walmer Castle, the official residence of the warden of the Cinque Ports, is about a mile to the south. It has become intimately associated with the name of the statesman Walpole, who died within its walls in 1795. Deal was possibly the site of a Roman station, but it has not received any definite identification. In the 13th century it was regarded as a subordinate member of the Cinque-Port guild; but even as late as the time of Henry VIII. it was still but a small village. Perkin Warbeck landed at this point in 1495. The castle was vainly besieged by the royalists in 1648, and in 1652 the Downs were the scene of Blake's victory over Van Tromp. Mrs Elizabeth Carter was a native of Deal. The population of the borough, which unites with Sandwich and Walmer in sending one member to Parliament, was, in 1871, 8009. The area is 1124 acres.

DEAN, Latin decanus, is derived from the Greek δικαος, ten; and whether the term was first used among the secular clergy to signify the priest who had a charge of inspection and superintendence over a parish, or among the regular clergy to signify the monk who in a monastery had authority over ten other monks, appears doubtful. "Decanus" may be found in early writers used to signify the same thing as "decanus," which shows that the word and the idea signified by it were originally borrowed from the old Roman monastic system.
The earliest mention which occurs of an "archipresbyter," seems to be in the 4th epistle of St. Jerome to Rusticus, in which he says that a cathedral church should possess one bishop, one archipresbyter, and one archdeacon. Liberatus also (Brewar. e. 14.) speaks of the office of archipresbyter in a manner which, as Bingham says, enables one to understand that the nature of his duties and position was. He thinks that those are right who hold that the archipresbyters were the same as the deans of our cathedral churches. Stillingsfeet (Irenic. part ii. c. 7) says of the archipresbyters that "the memory of them is preserved still in cathedraL churches, in the chapters there, where the dean was nothing else but the archipresbyter; and both dean and prebendaries were to be assistant to the bishop in the regulating the church affairs belonging to the city, while the churches were contained therein." Bingham, however, following Liberatus, describes the office of the archipresbyter to have been next to that of the bishop, the head of the presbyteral college, and the functions to have consisted in administering all matters pertaining to the church in the absence of the bishop. But this does not describe accurately the office of dean in an English cathedral church. The dean is indeed second to the bishop in rank and dignity, and he is the head of the presbyteral college or chapter; but his functions in no wise consist in administering any affairs in the absence of the bishop. There may be some matters connected with the ordering of the internal arrangements of our cathedral churches, respecting which it may be considered a doubtful point whether the authority of the bishop or that of the dean is supreme. But the consideration of any such question leads at once to the due theoretical distinction between the two. With regard to matters spiritual, properly and strictly so called, the bishop is supreme in the cathedral as far as—and no farther than—he is supreme in his diocese generally. With regard to matters material and temporal, as concerning the fabric of the cathedral, the arrangement and conduct of the services, and the management of the property of the chapter, &c., the dean (not excluding the due authority of the other members of the chapter, but speaking with reference to the bishop) is supreme. And the cases in which a doubt might arise on the point are those in which the material arrangements of the fabric or of the services may be thought to involve doctrinal considerations.

The Roman Catholic writers on the subject say that there are two sorts of deans in the church—the deans of cathedral churches, and the rural deans—as has continued to be the case in the English Church. And the probability would seem to be that the former were the successors and representatives of the monastic deacons, the latter of the inspectors of "ten" parishes in the primitive secular church. It is thought by some that the rural dean is the hunch of the parochial priests, who in the early church was the assistant of the bishop, discharging most, if not all, episcopai functions in the rural districts of the diocese. But upon the whole the probability is otherwise. Beveridge, Cave, Bingham, and Rawnsley all hold that the archipresbyters were true bishops, though it is not so evident in the foregoing instances of its use; nor is it by any means clear how and when the idea of seniority was first attached to the word. This office is held by the oldest cardinal—i.e., he who has been longest in the enjoyment of the purple, not he who is oldest in years—who is usually, but not necessarily or always, the bishop of Ostia and Velletri. Perhaps the use of the word "dean," as signifying the eldest member of any corporation or body of men, may have been first adopted from its application to that high dignitary. The dean of the sacred college is in the ecclesiastical hierarchy second to the Pope and first cardinal. His privileges and special functions are very many; a compendious account of the principal of them may be found in the work of Moroni, vol. ix. p. 168.

There are four sorts of deans of whom the law of England takes notice. 1. The dean and chapter are a council subordinate to the bishop, assistant to him in matters spiritual relating to religion, and in matters temporal relating to the temporalities of the bishopric. The dean and chapter are a corporation, and the dean himself is a corporation sole. Deans are said to be either of the old or of the new foundation—the latter being those created and regulated after the dissolution of the monasteries by Henry VIII. The deans of the old foundation (decani) were elected by the chapter on the king's compe" d' dire; and the deans of the new foundation (and, since the Act, of the old foundation also) are appointed by the king's letters patent. It was at one time held that a layman might be dean; but by 13 and 14 Charles II. c. 4, priest's orders are a necessary qualification. Deans are sinecurous in the old sense, i.e., they are without cure of souls. The chapter formerly consisted of canons and prebendaries, the dean being the head and an integral part of the corporation. By 3 and 4 Vict. c. 113, it is enacted that "all the members of the chapter except the dean, in every collegiate and cathedral church in England, and in the cathedral churches of St. David and Llandaff, shall be styled canons." By the same Act the dean is required to
be in residence eight months, and the canal three months, in every year. The bishop is visitor of the dean and chapter. 2. The dean of peculiar " hath no chapter, yet is representative, and hath cure of souls ; he hath a peculiar, and is not subject to the vestryman of the bishop." 3. The third dean " hath no cure of souls, but hath a court and a peculiar, in which he holdeth plea and jurisdiction of all such ecclesiastical matters as come within his peculiar. Such is the Dean of the Arches, who is the judge of the court of the arches, the chief court and consistory of the archbishop of Canterbury, so called of Bow Church, where this court was ever wont to be held." The parish of Bow and twelve others are within the peculiar jurisdiction of the archbishop in spiritual causes, and exempted out of the bishop of London's jurisdiction. 4. Rural deans are clergymen whose duty is described as being " to execute the bishop's processes and to inspect the lives and manners of the clergy and people within their jurisdiction " (see Phillimore's Ecclesiastical Law).

In the colleges of the English universities one of the fellows holds the office of dean, and is specially charged with the discipline, as distinguished from the teaching functions of the tutors.

DEBENTURE, a deed by which certain property is charged with the repayment of money lent at a fixed interest. It is commonly adopted by companies of a public nature as a means of raising money for carrying on their undertakings. The creation of debenture stock in such companies is regulated in England by the Companies Clauses Act, 1863, part iii., which makes debenture stock a prior charge on the undertaking, and gives the interest thereon priority of payment over all dividends or interest on any shares or stock of the company, whether ordinary or preference or guaranteed. Payment of arrears may be enforced by appointment of a receiver, or (in Scotland) of a judicial factor.

DEBRECZYN, or DEBRETEN, a royal free city of Hungary, the chief town of the comitats of Hadz, and one of the largest in the kingdom, is situated in the midst of a slightly elevated sandy plain 114 miles east of Pesth, with which it is connected by rail. It is a meanly-built, straggling town, with irregular suburbs stretching out into the plain, its wide roads are only paved with wood down the centre and along the sides, its houses are with few exceptions only one story high, and the courtyards or gardens with which they are usually furnished give the whole place the appearance of an overgrown village, in spite of the number of its public buildings. The most prominent of these is the principal Protestant church, which ranks as the largest in the country, but has no great architectural pretensions. In its immediate neighbourhood is the Protestant Collegium, a large and flourishing institution founded in 1792, and possessed of an extensive library. The town-house, the Franciscan church, the Parast monastery and college, and the theatre are worthy of mention; there are also hospitals, two gymnasia, and an agricultural academy. The industries of the town are pretty various, but none of them are of importance enough to give it the character of a manufacturing centre. Its tobacco-pipes, of the genuine national style, its sausages, and its soap are widely known; and the first of the three is imported to England and France. Flour and beet-root sugar are also manufactured. Every three months the neighbouring plain is covered with the booths and bunting of a great fair; but since the opening of the railway there is hardly so extensive a concourse as before. Between 300 and 400 square miles of territory belong to the municipality, which derives a large annual revenue from the woods, pastures, &c. The inhabitants are, with few exceptions, of Magyar origin and Calvinistic creed, and are in bad repute for their alleged selfishness and inhospitality. The town is of considerable antiquity, but owes its development to the refugees who flocked from the villages plundered by the Turks in the 15th century. In 1552 it adopted the Protestant faith, and it had to suffer in consequence, especially when it was captured in 1568 by the imperial forces. In 1569 it was made a royal free city. In 1848-9 it formed a refuge for the National Government and Legislature when Buda-Pesth fell into the hands of the Austrarians, and it was in the great Calvinist church that Komor read the proclamation that declared the house of Hapsburg to have forfeited the crown of Stephen. On the 3d of July the town was captured by the Russians. Population in 1869, 46,111.

DEBT is a sum certain due by one person to another. It may be created by contract, by statute, or by judgment. By the Judicature Act, 1873, any absolute assignment of any debt or other legal chose in action, of which express notice in writing shall have been given to the debtor, trustee, or other person from whom the assignor would have been entitled to receive or claim such debt, shall be deemed to be perfect in law. If the debtor receives notice that such assignment is disputed by the assignor, or any one claiming under him, he may call upon the parties to interplead concerning the same, or he may pay the money into court in conformity with the Acts for the Relief of Trustees. Order xiv. of the Rules of Court under the same Act contains the provisions under which the debts due to a person against whom a judgment has passed for the payment of money may be attached by the judgment creditor. See BANKRUPTCY.

DECALOGUE (in patristic Greek, δεκάλογον, sc., βίβλος or νευμενοβίβλος) is another name for the ten commandments, in Hebrew the ten words (Deut. iv. 43, x. 2, Exod xxxiv. 28), written on the two tables of stone, the so-called tables of the revelation (E. V., tables of testimony—Exxxiv. 29, comp. ch. xxiv. 21), or tables of the covenant (Deut. ix. 9). In Deuteronomy the inscriptions on these tables, which is briefly called the covenant (v. 13), is expressly identified with the words spoken by Jehovah out of the midst of the fire at Mount Sinai in the ears of the whole people on the "day of the assembly," and rehearsed in ch. v. 6-21. In the narrative of Exodus the relation of the "ten words" of ch. xxxiv. to the words spoken from Sinai, ch. xx. 2-17, is not so clearly indicated—a circumstance which has given rise to speculations as to the possible existence of a second decalogue. Before entering on this question, however, we must examine the decalogue as usually understood and embodied in the parallel passages in Exod. xx. and Deut. v.

1. The variations in the parallel texts, so far as they are important for the criticism of the decalogue, are mainly two. (a) The reason assigned for the institution of the Sabbath in Exodus is drawn from the creation, and agrees with Gen. ii. 3. In Deuteronomy the command is based on the duty of humanity to servants and the memory of Egyptian bondage. (b) In the tenth commandment, as given in Exodus, "house" means house and household, and in Deuteronomy, "thou shalt not covet thy neighbour's wife," comes first, and "house" following in association with field is to be taken in the literal restricted sense.

2. The construction of the Hebrew text of the second commandment is disputed, but the most natural sense seems to be, "Thou shalt not make unto thee a graven image, [and] to no visible shape in heaven, &c., shalt thou bow down, &c." The third commandment might be better rendered, "Thou shalt not utter the name of the Lord thy God vainly."—3. Divisions of the Decalogue.—The division current in
DECALOGUE

England and Scotland, and generally among the Reformed (Calvinistic) churches and in the Greek Church, is known as the Philonic division (Philo de Decalogu, § 12). It is sometimes called by the name of Origin, who adopts it in his *Homilies on Exodus*. On this scheme the preface, Exod. xx. 2, has been usually taken as part of the first commandment. The Church of Rome and the Lutherans adopt the Augustinian division (Aug. *Quast. super Exod., *Ixxii.), combining into one the first and second commandments of Exodus, and splitting his tenth commandment into two. To gain a clear distinction between the ninth and tenth commandments on this scheme it has usually been felt to be necessary to follow the Deuteronomic text, and make the ninth commandment, *Thou shalt not covet* they neighbour's wife, as scarcely any scholar will now claim priority for the text of Deuteronomy, this division may be viewed as exploded. But there is a third scheme (the Talmudic) still current among the Jews, and not unknown to early Christian writers, which is still a rival of the Philonic view. The preface, Exod. xx. 2, is taken as the first word, and the second embraces verses 3–6. Among recent Christian writers who have adopted this view are Knobel (in his *Com. on Exodus*) and Kuenen (Godsdienst van Israel, i. 278 ff.). The decision between Philo and the Talmud must turn on two questions. Can we take the preface as a separate word? And can we regard the prohibition of polytheism and the prohibition of idolatry as one commandment? Now, though the Hebrew certainly speaks of ten words, not of ten “precepts,” it is most unlikely that the first word can be different in character from those that follow. But the statement “I am the Lord thy God,” is either no precept at all, or only enjoins by implication what is expressly commanded in the words “Thou shalt have no other gods before me.” Thus to take the preface as a distinct word is not reasonable unless there are cogent grounds for uniting the commandments against polytheism and idolatry. But that is far from being the case. The first precept of the Philonic scheme enjoins monolatry, the second expresses God's spiritual and transcendental nature. According to Kuenen does not deny that the prohibition of images contains an element additional to the precept of monolatry, but, following De Goeje, regards the words from “thou shalt not make unto thyself” down to “the waters under the earth” as a later insertion in the original decalogue. Unless this can be made out—of which below—the scheme is clearly best, and as such it is now accepted by most scholars.

How were the ten words disposed on the two tables? The natural arrangement (which is assumed by Philo and Josephus) would be five and five. And this as Philo recognized, is a division appropriate to the sense of the precepts; for antiquity did not look on piety towards parents as a mere precept of duty, part of one’s duty towards one’s neighbour. The authority of parents and rulers is viewed in the Old Testament as a delegated divine authority, and the violation of it is akin to blasphemy (comp. Ex. xxii. 17, Lev. xx. 9, with Lev. xxiv. 15, 16, and note the formula of treason, 1 Kings xxi. 13).

We have already noticed that the ten words are differently treated by the two halves of the decalogue, according to the inclination of the text (Exod. ii. 22). The prophet Hosea has the ten words written on both sides (Ex. xxxii. 15). But we shall presently see that there may be another way out of this difficulty.

4. **Critical questions.**—That the decalogue not only contains Mosaic ideas, but is as old as Moses in its form as a system of “ten words,” is admitted by critics of almost every school. But it is much disputed what the original compass of the decalogue was. Did the whole text of Exod. xx. 2–17 stand on the tables of stone? The answer to this question must start from the reason annexed to the fourth commandment, which is different in Deuteronomy. But the express words “and he added no more,” in Deut. v. 22, show that there is no conscious omission by the Deuteronomic speaker of part of the original decalogue, which cannot therefore have included the reason annexed in Exodus. On the other hand the reason annexed in Deuteronomy is rather a parenetic addition than an original element dropped in Exodus. Thus the original fourth commandment was simply “Remember the Sabbath day to keep it holy.” When this is granted it must appear not improbable that the elucidations of other commandments may not have stood on the tables. Thus in the second commandment, “Thou shalt not bow down to any visible form,” *de qua.,* is a sort of explanatory addition to the precept “Thou shalt not make unto thee a graven image.” And so the promise attached to the fifth commandment was probably not on the tables, and the tenth commandment may have simply been, “Thou shalt not covet thy neighbour’s house,” which includes all that is expressed in the following clauses. Such a view gets over the difficulty arising from the unequal length of the two halves of the decalogue. The elucidations (unless in the case of the fourth commandment) may very well be as old as Moses (comp. Ewald, *Geschichte,* ii. 232). It is quite another question whether there is any idea in the decalogue which cannot be as old as Moses. It is urged by many critics that Moses cannot have prohibited the worship of Jehovah by images; for the subsequent history shows us a descendant of Moses as priest in the idolatrous sanctuary of Dan. There were temples in David’s house, and the worship of Jehovah under the image of a calf was the state religion of the kingdom of Ephraim. It is argued from these facts that image worship went on unchallenged, and that this would not have been possible had Moses forbidden it. This argument does not appear to have all the force that Kuenen and others attach to it, for it must be remembered that section of Christendom, in times much more advanced than those of the Old Testament, has accepted the decalogue and yet has worshipped images. And on the other side we have the much more cogent arguments that the number of ten words, which no one doubts to be primitive, cannot be naturally made out if the law against images is dropped, and that the existence of this law is necessary to explain the fact that the unquestionably Mosaic sanctuary of the ark, which is just the sanctuary of the revelation of the ten words, embodies the principle of the worship of Jehovah without images in a distinct and practical form. It may be added that the prohibition of images of hewn stone, which is the primitive sense of the word “graven-image,” can hardly be less ancient than the conception that the stones of an altar were defiled by the touch of the chisel (Exod. xx. 24). And this is a conception which cannot be viewed as a later refinement on Mosaic ideas.

5. **The Decalogue of Exodus.**—In the book of Exodus the words written on the tables of stone are no where expressly identified with the ten commandments of

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3 So, for example, Augustine, 1. c. Thomas, Summa (Prima Secunda, qu. c. art. 4), and recently Sommig and Kurtz. Purely arbitrary is the idea of Lutheran writers (Gerhard, *Lei. xxi.* § 46) that the ninth commandment forbids consequences actual, the tenth commandment.

4 Exceptions to the consensus are Vitkis (*Biblioth. Theol.,* p. 202) and Noldeke (*Untersuchungen,* p. 51).

5 It is generally assumed that the addition in Exodus is from the hand that wrote Gen i.–xx. 4.
The Decalogue in Christian Theology.—Following the New Testament, in which the "commandments" mentioned in the law of love are identified with the precepts of the decalogue (Mark x. 19, Rom. xiii. 9, 10; Mark xii. 28, 31), the ancient church emphasized the permanence of the ten commandments as a summary of natural in contradistinction to ceremonial precepts, though the observance of the Sabbath was to be taken in its spiritual sense (Augustine, De Spiritu et Littera, XIV.; Jerome, De Celebriete Paschae). The medieval theologians followed in the same line, recognizing all the precepts of the decalogue as moral precepts de lege naturae, though the law of the Sabbath is not of the law of nature, in so far as it prescribes a determinate day of rest (Thomas, Summa, I, 104, q. 11, art. 3, Duns, Super Sententias, lib. iii, dist. 37). The most important medieval exposition of the decalogue is that of Nicolaus de Lyra, and the 15th century, in which the decalogue acquired special importance in the confessional, was prolific in treatises on the subject (Antoninus of Florence, Gerson, etc.).

Important theological controversies on the decalogue began with the Reformation. The question between the Lutheran (Augustanus) and Reformed (Phiolom) division of the ten commandments was mixed up with controversy as to the legitimacy of sacred images not designed to be worshipped. The Reformed theologians took the stricter view. The identity of the decalogue with the eternal law of nature was maintained in both churches, but it was an open question whether the decalogue, as such (that is, as a law given by Moses to the Israelites), is of perpetual obligation. The Socinians, on the other hand, regarded the decalogue as abrogated by the more perfect law of Christ; and this view, especially in the shape that the decalogue is a civil and not a moral law (J. D. Michaelis), was the current one in the period of rationalism in last century. The distinction of a permanent and a transitory element in the law of the Sabbath has been found, not only in Luther and Melanchthon, but in Calvin and other theologians of the Reformed church. The main controversy which arose on the basis of this distinction was whether the prescription of one day in seven is of permanent obligation. It was admitted that such obligation must be natural but positive, but it was argued by the strongest Calvinists that the proportion of one in seven is agreeable to nature, based on the order of creation in six days, and in no way specially connected with anything Jewish. Hence it was regarded as a universal positive law of God. But those who maintained the opposite view were not excluded from the number of the orthodox. The later conception found a place in the Cocceian school.

Literature.—Geikie, Uber die verschiedenen Erscheinungen des Dekalogus und den Einfluss derer auf die Kultur, Erdau's History of Israel, vol. ii; Schulte's and especially Oehler's Old Testament Theology, Oehler's article "Dekalog" in Herzog's Encyclopaedia, commentary on Exodus, especially that of Knobel in German, and in English of Kaisch, Kuenen's Godskond von Israel, Hiltz u. Kurtz, Geschichte des Alten Bundes, Bd ii, other literature cited by Oehler and by Knochel, Biblische Geschichte, 1879. A further guidance in the theological controversies about the Decalogue the student may consult Walch and Baumgarten. (W E S)

DECAMPS, ALEXANDRE GABRIEL (1803-1869), one of the foremost painters of the modern French school, was born in Paris on the 2d March 1803. He received his artistic training from Abel de Puyol, but set himself free at an early period of his career from academic trammels. He asserted his originality in his choice of subjects as well as in his style of treatment. In his youth he travelled in the East, and reproduced Oriental life and scenery with a bold fidelity to nature that made his works the puzzle of conventional critics. His powers, however, soon came to be recognized, and he was ranked along with Delaroche and Vernet as one of the leaders of the French school. At the Paris Exhibition of 1855 he received the grand council medal. Most of his life was passed in the neighbourhood of Paris. He was passionately fond of animals, especially dogs, and indulged in all kinds of field sports. He died on the 23d August 1860 in consequence of being thrown from a vicious horse while hunting at Fontainebleau. The style of Decamps was characteristic and intensely French. It was marked by vivid dramatic conception, by a manipulation bold and rapid, sometimes even awkward, and especially by original and startling use of device.

1 Ostern und Pfingsten am zweiten Dekalog, Heidelberg, 1838
2 Wellhausen in Jacoby's, J. D. Theol., 1876, p. 554
decided contrasts of colour and of light and shade. His subjects embraced an unusually wide range. He availed himself of his travels in the East in dealing with scenes from scripture history, which he was probably the first of European painters to represent with their true and natural local background.

Of this class were his Joseph sold by his Brethren, Moses taken from the Nile, and his scenes from the life of Samson, nine vigorous sketches in charcoal and chalk, perhaps the most expressive of his abilities. These pictures are his Defeat of the Cimbri, representing with wonderful skill the conflict between a horde of barbarians and a disciplined army. Decamps produced a number of genre pictures, chiefly of scenes from French and Algerine domestic life, the most marked feature of which is humour. The same characteristic attaches to most of his numerous animal paintings. He painted dogs, horses, etc., with great fidelity and sympathy; but his favourite subject was monkeys, which he depicted in various studies and sketches with a grotesque humour that could scarcely be surpassed. Probably the best known of all his works is The Monkey Commissaire, a clever satire of the jury of the French Academy of Painting, which had rejected several of his earlier works on account of their divergence from any known standard. The pictures and sketches of Decamps were first made familiar to the English public through the lithographs of Eugene de Rohu. See Moreau’s Decamps et ses Éuvres (Paris, 1859).

DE CANDOLLE, AUGUSTIN PYRAMUS (1778-1841), a celebrated botanist, was born at Geneva, February 4, 1778. He was descended from one of the most ancient families of Provence, and his ancestors had been exasperated for their religion in the middle of the 16th century. His father was a famous printer, and syndic of the university and republic. Though a weakly boy he showed great aptitude for study, and distinguished himself at school by his rapid attainments in classical and general literature, and specially by a faculty for writing elegant verse, which led Florian to anticipate that he might become famous as a poet. He showed remarkable powers of memory, which proved of the greatest service to him in the science to which he ultimately devoted himself. His interest in plants was first roused while he was residing with his mother at a remote country village during the siege of Geneva in 1792. He began his scientific studies at the college of Geneva, by attending the courses of Sussens and Vaucher, the latter of whom first inspired him with the determination to make the botanical science the chief pursuit of his life. In 1796 he removed to Paris, where he resided with Dolomieu, attended various courses of lectures on natural science, and gained the friendship of Jussieu and Desfontaines. His first productions, Historia Plantarum Succulentarum (4 vols., 1799) and Astrologographia (1802), introduced him to the notice of Curtier (whose chair in the Collège de France he supplied in 1802), Humboldt, Biot, and Lamarck, who afterwards confided to him the publication of the third edition of the Flore Française (1803-15). The introduction to this work contained the first exposition of his principle of classification according to the natural as opposed to the Linnean or artificial method. Having been elected (1804) doctor of medicine by the medical faculty of Paris, he wrote: as an inaugural work, the Essai sur les propriétés médicinales des plantes comparées avec leurs formes extérieures et leur classification naturelle, and soon after, in 1806, his Synopsis plantarum in flora Galliae descriptarum. At the desire of the French Government he spent the summers of the following six years in making a botanical and agricultural survey of the whole kingdom, the results of which he published in 1813. In 1807 he was appointed professor of botany in the medical faculty of the university of Montpellier, and in 1810 he was transferred to the newly founded chair of botany of the faculty of sciences in the same university. He was an admirable lecturer, and the gardens under his charge were much improved during his occupancy of the chair. From Montpellier he removed to Geneva in 1816, having been invited by the now independent republic to fill the newly created chair of natural history. The rest of his life was spent in an attempt to elaborate and complete his “natural” system of botanical classification. The publication of his labours in this department are his Regni vegetabilis systema naturale, of which two volumes only were completed (1821) when he found that it would be impossible for him to execute the whole work on so extensive a scale. He accordingly commenced in 1824 a less extensive work in the same direction—his Prodromus systematis regni vegetabilis—but even of this he was able to finish only seven volumes, or two-thirds of the whole. It was carried on after his death by his son Alphonse, who in 1834 had succeeded him in his professorship. He had been for several years in delicate health when he died on the 9th September 1841 at Turin, whether he had gone to attend a scientific reunion. De Candolle received diplomas or the honour of membership from most of the learned societies of Europe, and was a very frequent contributor to their Transactions. Louis Philippe decorated him with the cross of the Legion of Honour. He was highly esteemed in his native city, where he was for a long period rector of the academy and a member of the municipal board. For an estimate of his place as a botanist see Botany, vol. iv. p. 80.

See Flore des États de Candolle (1842), and De la Vie’s Candolle, sa Vie et ses Travaux (1851).

DECAPOLIS, a district of Palestine, or perhaps rather a confederation of districts, situated, with the exception of a small portion, on the eastern side of the Upper Jordan and the Sea of Tiberias. Its boundaries are not accurately known, and probably were never precisely defined. It evidently takes its name from the fact that it included ten cities (diesa polis), but the ancient geographers do not agree as to which these ten cities were. This difference of statement may be explained by the supposition that, like the Cinque Ports of England, Decapolis preserved its original designation after new members were received into the confederation, and perhaps some of the old members had lost their connection. Piny recognizes the uncertainty, but gives the following list:—Damascus, Philærophus, Raphana, Scythopolis on the west side of the Jordan, Canatha, Hippos, Pisba, Galana (Gerasa), and Canatha. Damascus is the only one that retains its importance, Scythopolis, or Beth-Shan, which seems to have been anciently the next in size, is represented by the village of Beisan; and Gerasa, Canatha or Kenanith, and Pisba are of interest only for their ruins. Decapolis was placed by the Romans under the jurisdiction of the Syrian governor, and seems to have enjoyed special privileges. Regarding the rise and decay of the confederation we have no precise information, but it was at the height of its prosperity in the time of Christ.

DECATUR, a flourishing city of the United States, capital of Marion county, Illinois, situated in the midst of a rich agricultural district to the right of the Sangamon river, at a railway junction about 38 miles east of Springfield. It is well built, and has 15 churches and 24 public schools; but none of its edifices are individually remarkable. Among its industrial establishments is a large rolling mill. Population in 1870, 7154.

DECCAN (DARSHIN, the Country of the South), in India, includes, according to Hindu geographers, the whole of the territories situated to the south of the Nerbudda. In its more modern acceptation, however, it is sometimes understood as comprising only the
country lying between that river and the Krishna, the latter having for a long period formed the southern boundary of the Mahometan empire of Delhi. Assigning it the more extended of these limits, it comprehends the whole of the Indian peninsula, and in this view the mountainous system, consisting of the Eastern and Western Ghats, constitutes the most striking feature of the Deccan. These two mountain ranges unite at their northern extremities with the Vindhyas chain of mountains, and thus is formed a vast triangle supporting at a considerable elevation the expanse of table-land which stretches from Cape Comorin to the valley of the Nerbudda. The surface of this table-land slopes from west to east as indicated by the direction of the drainage of the country,—the great rivers the Cauvery, Godavery, Krishna, and Pennaur, though deriving their sources from the base of the Western Ghats, all finding their way into the Bay of Bengal through fissures in the Eastern Ghats.

In early times this country embraced that possessed by the five Hindu princes of Telengana, Maharshta, the Tanul country, Orasa, and Carnata or Bajiyanagar. It was first invaded by the Mahometans in 1294, who stormed Deogur, the capital of Maharshta, and abandoned the city to pillage. In the year 1325 the Mahometans made further progress in its conquest, and having extricated the Hindu dynasties, they annexed the provinces as far south as the Krishna to the empire of Delhi. The imperial sway was, however, of brief duration. Telengana and Carnata speedily reverted to their former masters, and this defection on the part of the Hindu states was followed by a general revolt, resulting in the establishment in 1347 of the independent Mahometan dynasty of Bahman, and the consequent withdrawal of the power of Delhi from the territory south of the Nerbudda. In the struggles which ensued, the Hindu kingdom of Telengana fell to the Mussulmans, who at a later period formed a league against the remaining Hindu princes, and at the battle of Talikota in 1565 destroyed the monarchy of Bajiyanagar or Carnata. On the dissolution of the Bahman empire, its dominions were distributed into the five Mahometan states of Golconda, Bajpaur, Ahmednagar, Bedar, and Derar. Of these the latter succeeded in subverting those of less importance, and in 1639, during the reign of Shah Jahn of Delhi, the greater proportion of the Deccan had been absorbed by the kingdoms of Golconda, Ahmednagar, and Bajpaur. During the reign of Aurungzebe (in the latter half of the 17th century) all these states were reduced, and in 1707 the capital of the Deccan at Bijapur was annexed to the empire of Delhi. In the subsequent reigns, when the great empire of Aurungzebe fell into decay, the Nizam threw off his allegiance and fixed his court at Hyderabad. At the same time the Mahrattas, emerging from obscurity, established a powerful monarchy, which was usurped by the Peshwa. The remainder of the imperial possessions in the peninsula were held by chieftains acknowledging the supremacy of one or other of these two potentates. In the sequel, Mysore became the prize of the Mahometan usurper Hyder Ah. During the contest for power which ensued about the middle of the last century between the native chiefs, the French and the English took opposite sides. After a brief course of triumph, the interests of France declined, and a new empire in India was established by the British. Mysore formed one of their earlier conquests, Tanjore and the Carnatic were shortly after annexed to their dominions. In 1818 the forfeited possessions of the Peshwa added to their extent; and these acquisitions, with others which have more recently fallen to the paramount power by cession, conquest, or purchase, form a continuous territory stretching from the Nerbudda to Cape Comorin. Its length is upwards of 1000 miles, and its extreme breadth exceeds 800. This vast tract comprehends the chief provinces now distributed between the presidencies of Madras and Bombay, together with the native states of Hyderabad and Mysore, and those of Kolapur, Sawantwatar, Travancore, Cochin, and the petty possessions of France and Portugal.

DECEMBER, the last month of the year. In the Roman calendar, traditionally ascribed to Romulus, the year was divided into ten months, the last of which was called December, or the tenth month, and this name, though etymologically incorrect, was retained for the last or twelfth month of the year as now divided. In the Romulan calendar December had thirty days; Numa reduced the number to twenty nine, Julius Caesar added two days to this, giving the month its present length. The Saturnalia occurred in December, which is therefore styled "acceptus genus" by Ovid (Fasti, m 58), and this also explains the phrase of Horace "libertate December utere" (Sat. ii 7). Martial applies to the month the epithet omnis (hosery), and Ovid styles it gelidus (frosty) and fumans (smoky). The Saxons called it wintar-monath, or winter month, and helighe-monath, or holy month, from the fact that Christmas falls within it. The 23rd December is the date of the winter solstice, when the sun reaches the tropic of Capricorn.

DECEMBIRI (i.e. the ten men), ten magistrates of absolute authority among the Romans. Their appointment, according to Roman tradition, was due to plebean dissatisfaction with the capricious administration of justice by the patricians, who had no written law to direct them. On the representation to the senate of the popular grievances by the tribunes, commissioners were sent to Greece to collect the laws of Solon and of the other celebrated legislators of Greece. On the return of these commissioners it was agreed, after much discussion, that ten new magistrates, called decemvirs, should be elected from the senate to draw up a body of laws. Their election involved the abdication of all other magistrates; they were invested with supreme power, and presided over the city with regal authority. They were, each in turn, clothed with the badges of the consulsip, and the one so distinguished had the power of assenting to the decrees of the decemvirs and confirming its decrees. The first decemvirs were chosen in the year 302 A.D. (313 B.C.) They arranged the laws by which their government was to be regulated, prepared the code, decrees, and confirming its decrees. The first decemvirs were chosen in the year 302 A.D. (313 B.C.) They arranged the laws by which their government was to be regulated, prepared the code, decrees, and confirming its decrees. The first decemvirs were chosen in the year 302 A.D. (313 B.C.) They arranged the laws by which their government was to be regulated, prepared the code, decrees, and confirming its decrees. The first decemvirs were chosen in the year 302 A.D. (313 B.C.) They arranged the laws by which their government was to be regulated, prepared the code, decrees, and confirming its decrees. The first decemvirs were chosen in the year 302 A.D. (313 B.C.) They arranged the laws by which their government was to be regulated, prepared the code, decrees, and confirming its decrees. The first decemvirs were chosen in the year 302 A.D. (313 B.C.) They arranged the laws by which their government was to be regulated, prepared the code, decrees, and confirming its decrees.
with that of the earlier magistrates bearing the same name, and connected by some scholars, not only with the republic, but with the kings. There were also the Decemvirs Sacrorum, who were custodians of the Sibylline books. Their number, which originally consisted of two, and afterwards of ten, at last reached fifteen. It devolved on these functionaries not only to guard the Sibylline books, and to consult them on all emergencies of state, but also to take a prominent part in the celebration of the games of Apollo.

DECIMAL COINAGE.

The abolition of the old coinage, which was generally fixed at so many pence per hour. The reduction of sums expressed in the old coinage to their equivalents in the new would, however, be slightly more difficult than under the first system.

A third scheme proposes as the unit the half-sovereign, a coin almost as familiar as the sovereign, with the view of having only three instead of four coins of account. The half-sovereign would be divided into 10 shillings as at present, and the shilling into 10 pence, each of which would therefore be equivalent to 1 d., or 20 per cent. more than the present penny. As a penny is of more value than the smallest piece, the present copper coinage could be made to serve under the new system. This scheme, from its alteration of the value of the penny, is open to most of the objections that can be brought against the first; and, in comparing accounts expressed in the old and the new coinages, it would necessitate—a very slight inconvenience certainly—multiplication or division by 2.

A fourth scheme proposes that the penny be made the unit of value, and that all accounts should be kept in tenths and pence. All the present coins, though only one of them would be a coin of account, could still remain in circulation; and only two new coins would be required, the tenth and its half, fivepence.

It has also been proposed that there should be only two coins of account, the higher equivalent to 100 of the lower, such as florins and cents, the cent in this scheme being the mil of the first. Centesimal coinage similar to this exists in several foreign countries, &c.; but it is probable that, should a change be made, the practice of other nations will be limited only where it is found to conduct to national convenience.

The preceding are the most important of the schemes that have been suggested to replace the present system, and the adoption of the first of them has been recommended in the House of Commons. But since 1855 public opinion on the question does not appear to have advanced much. The arguments for and against a change are numerous, and to detail them would be to fill a moderate volume. The principal reason for making the change is that calculation would be enormously simplified, for reduction from one denomination of money into another could always be performed at sight; and the compound rules, as far as money is concerned, would be virtually abolidished. The greatest objections to the change, apart from the difficulty of getting people to make it, which is doubtless much exaggerated, are that a decimal system does not admit of a sufficient extent of binary subdivision, and that it does not admit of ternary subdivision at all. The third part, for instance, of a pound, or of a florin, of a cent, being 333½, 333¾, 3¾ mls respectively, could not be exactly paid in decimal currency, while there is no difficulty in paying the third part of a pound, or of a shilling by the present coinage.

The chief advantage of this system is that it would abolish the copper farthing, halfpenny, and penny, and the silver coins representing 3d., 4d., 6d. Since 6d. = 25 mls is the lowest number of pence which could be paid exactly in mls, inconvenience would thus be caused to the poorer classes, whose unit of value may be said to be the penny; and difficulties would also arise in cases where fixed imposts of a penny and halfpenny are levied, such as penny and halfpenny tolls, postages, &c.

A second scheme advocates the adoption of the farthing as the unit of value, and its coins of account would be the farthing, the cent or 2d., and the pound or 10 florins. The coins required for carrying out the halfpenny would probably be—in copper, the farthing, the 3-cent, the halfpenny, in silver, the cent or 2d., and the florin = 5d. The reduction of the sovereign to 10s. 5d., and the sovereign = 20s. 10d. Here also a silver double florin = 4s. 2d., and a gold crown = 5s. 2½d., might be found convenient.

The chief disadvantages of this system would be the present pound sterling, the unit of value in commercial offices, and the trouble that would thereby be caused in comparing values expressed in the old coinage with those of the new. Among its advantages may be reckoned the fact that, during the transition to the new state of things, the old coins would still be serviceable, for any sum of money expressed in the new coinage could be paid by means of them. The alterations on small imposts, requisites under the first scheme, would here be unnecessary; and inconvenience would be saved to those classes of the population who receive wages, which are generally fixed at so many pence per hour. The reduction of sums expressed in the old coinage to their equivalents in the new would, however, be slightly more difficult than under the first system.
siderably to preponderate, and the introduction of it to be merely a question of time.

The coinage of the United States, which was made decimal in 1866, consists of the eagle = 10 dollars, the dollar = 10 dimes, the dime = 10 cents, but of these denominations dollars and cents are the only ones commonly used in France, shortly after the great Revolution, a decimal system not only of money, but also of weights and measures, was introduced. The standard of value as the franc = 100 centimes; but though the only coin found in the franc, centimes, and multiples of these, the word sou, a term belonging to the superseded coinage, is often used to denote the 20th part of the franc, or 5 centimes. The Belgian and the Swiss monetary systems were assimilated to that of France in 1833 and 1831; and in 1865 France, Italy, Belgium, and Switzerland, became parties to a treaty for the maintenance of a common system. Germany, within the last few years, has effected a reform of her currency, the mark, which corresponds closely to our shilling, being = 10 groschen = 100 pfennige. A decimal coinage exists also in Russia, where the ruble = 100 kopecks ; in Holland, where the guilder = 12 dubbeltjes = 100 cents, and in Portugal, where the milreis = 1000 reis.


DECUS MUS. See MUS.

DECLARATION in an action at law was the first step in pleading—the formal statement of the matter in respect of which the defendant sued. It was divided into counts, in each of which a specific cause of action was alleged, but the causes used were cautious and general, and the same matter might be the subject of several counts. By the simpler form of pleading established by the Judicature Act, 1873, the declaration is replaced by a statement of claim setting forth the simple facts on which the plaintiff relies.

Statutory declaration.—By 5 and 6 Will. IV. c. 62 (which was an Act to undo, &c., the abolition of unnecessary oaths, and to repeal a previous Act of the same session on the same subject) various cases are specified in which a declaration shall be substituted for an affidavit on oath. There is a general clause empowering any justice of the peace, or notary public, or other officer now or hereafter authorized to administer an oath, to take and receive the declaration of any person voluntarily making the same before him in the form in the schedule to the Act annexed; and if any declaration so made shall be false or untrue in any material particular, the person wilfully making such false declaration shall be deemed guilty of a misdemeanour.

DECLARATION OF PARIS, a diplomatic instrument or protocol agreed by the representatives of all the powers present at the Congress of Paris in 1856, and subsequently accepted as a binding engagement of public law by all the other powers (except the United States of America, Spain, and Mexico), for the purpose of setting and defining certain rules of maritime law, in time of war, on points of great moment to belligerent and neutral states—points, it must be added, upon which the ancient law of nations had gradually undergone some change, and on which great influences of opinion and practice prevailed. The four propositions agreed to by the plenipotentiaries were embodied in the following terms:—

1. Privileges are and remains abolished.
2. The neutral flag covers enemy's goods, with the exception of contraband of war.
3. Neutral goods, with the exception of contraband of war, are not liable to capture under an enemy's flag.
4. Blockades, in order to be binding, must be effective,—that is to say, maintained by a force sufficient readily to prevent access to the coast of the enemy.

By most of the modern writers on international law these principles are regarded as a distinct gain to the cause of civilization, international justice, commerce, and peace. But a feeds and ineffectual attempt has been made to codify these new rules of maritime law, though they received the tacit assent of Parliament, and have been acted upon by all nations in the six wars which have occurred since 1856, including the American civil war, although the United States had not concurred in the Declaration. The American Government withheld its assent, not because it objected to these principles, but because it held that they did not go far enough, and that they ought to be extended to secure from capture all private property at sea. It is argued by the opponents of the Declaration that the British envoy at Paris exceeded his powers, that the form of the instrument itself is declaratory, but not binding either as a contract or a legislative act, that it is not competent to a congress to change the rights of belligerents founded on ancient law and usage, and that Great Britain committed a fatal error in renouncing the right to seize enemy's goods in neutral ships and to equip privateers.

To these arguments it is said in reply that the British envoy at Paris had full powers to pledge the faith of the Crown, with the concurrence of the Cabinet, and that if Parliament disapproved his conduct, it ought to have been pressed to a division at the time, and not when Great Britain has enjoyed the benefit of the Declaration, as a neutral, for twenty years. It is a part of the prerogative of the Crown to fix our international relations, and to determine the condition of maritime warfare. The most fitting and binding expression of international law (which cannot assume the form of positive law by sovereign enactment) is to be found in instruments recording in solemn form the consent of all civilized nations. On the ground of expediency, it is contended by the supporters of the Declaration of Paris, that Great Britain is, of all countries in the world, that which has most to gain by it, because she is not only the greatest naval power, but the power which has the largest number of merchant vessels and the largest amount of property afloat on the seas, and liable to attack. The primary advantages of the Declaration of Paris were to accede to neutrals, as it secures to them a larger carrying trade in time of war, and exempts them from the seizure of enemy's goods in neutral ships. Hence, if a belligerent were now to violate the rules of the Declaration, he would have to encounter the opposition of all neutral states, and would speedily find them arrayed on the side of the enemy. But in the event of war, Great Britain is the state most exposed, by reason of the magnitude of her maritime trade, to the depredations of hostile cruisers, the injury done to be measured by the amount of the shipping and property exposed to it, and a single cruiser of a small state may cause enormous losses to the commerce of a great power, as was seen in the American civil war. Since the establishment of a general system of railroads, the greater part of the trade of all the states of continental Europe can be carried on by land, either by direct communication or through neutral ports. The power of a naval state to inflict serious injury on an enemy by the interruption of her trade is therefore by the nature of things greatly diminished, and the same remark applies to commercial blockades to England all foreign commodities must be brought by sea, and England is more dependent than any other country on foreign trade for the raw material of her manufactures, and even for the food of her inhabitants. It is therefore the paramount interest of England to keep open all the channels of trade as much as possible, both in peace and war, and injuries done to the trade of an enemy are often equally prejudicial to the state which
inflicts them. These are some of the leading arguments which have been advanced in defence of the Declaration of Paris, and which no doubt actuated the authors of it.

A full account of the controversy will be found in the third volume of Sir Robert Phillimore's Commentaries on International Law, where the learned author supports and advocates the old traditions of the Court of Admiralty, and also in Hall's Rights and Duties of Neutrals (1874). The principles on which the Declaration of Paris is based are explained and defended in an article in the Edinburgh Review, No. 298. (H. B.)

DECLARATOR, in Scotch law, is a form of action by which some right of property, or of servitude, or of status, or some inferior right or interest, is sought to be judicially declared (see Bell's Dictionary and Digest of the Law of Scotland.)

DECREE, DECRET, the judgment of a court of justice, and, in English law, more particularly the judgment of a court of equity. A decree nisi is the conditional order for a dissolution of marriage made by the court for divorce and matrimonial causes, which will be made absolute after six months, in the absence of sufficient cause shown to the contrary.

DECRES, in canon law, are the answers sent by the Pope to applications made to him as head of the church, chiefly by bishops, but also by synods, and even private individuals, for guidance in cases involving points of doctrine or discipline. In the early days of the church these replies came to be circulated throughout the various dioceses, and furnished precedents to be observed in analogous circumstances. From the 4th century onwards they formed the most prolific source of canon law. Decrees (decet constituta decretales, epistolae decretales, or shortly decretales, or decretales) ought, properly speaking, to be distinguished, on the one hand from constitutions (constitutiones pontifices), or general laws enacted by the Pope sua sponte without reference to any particular case, and on the other hand from rescripts (rescripta), which apply only to special circumstances or individuals, and constitute no general precedent. But this nomenclature is not strictly observed.

For further information see art. CANON LAW, in which will also be found an account of the Pseudo-Literaria or False Decrees.

DECURIO, an officer in the Roman cavalry, commanding a decurium, which was a body consisting of ten men. There were certain provincial magistrates called decuriones municipales, who had the same position and powers in free and corporate towns as the senate had in Rome. As the name implies, they consisted at first of ten, but in later times the number was often as many as a hundred; their duty was to watch over the interests of their fellow-citizens, and to increase the revenues of the commonwealth. Their court was called curia decurionum, and minor sensatus, and their decrees, called decreta decurionum, were marked with D. D. at the top. They generally styled themselves civitatum potestates curiales, and honorates municiporum senatores. They were elected with the same ceremonies as the Roman senator, and they required to be at least twenty-five years of age, and to be possessed of a certain fixed income. The election took place on the kalends of March.

DEE, JOHN (1527–1608), a mathematician and astrologer, was born in July 1527, in London, where his father was a wealthy vintner. In 1542 he was sent to St John's College, Cambridge. After five years' close application to mathematical studies, particularly astronomy, he went to Holland, in order to visit several eminent Continental mathematicians. Having remained abroad nearly a year, he returned to Cambridge, and was elected a fellow of Trinity College, then first created by King Henry VIII. In 1548 he took the degree of master of arts; but in the same year he found it necessary to leave England on account of the suspicions entertained of his being a conjurer, which were first excited by a piece of machinery, in the Irene of Aristophanes, he exhibited to the university, representing the seerabuses flying up to Jupiter, with a man and a basket of victuals on its back. On leaving England he went first to the university of Louvain, where he resided about two years, and then to the college of Iesiens, where he read lectures on Euclid's Elements, with great applause. On his return to England in 1551 King Edward VI appointed him a pension of 100 crowns, which he afterwards exchanged for the rectory of Upton-upon-Severn. Soon after the accession of Mary, he was accused of using enchantments against the queen's life; but after a tedious confinement, he obtained his liberty in 1553, by an order of council.

When Elizabeth ascended the throne, Dee was asked by Lord Dudley to name a propitious day for the coronation. On this occasion he was introduced to the queen, who took lessons in the mystical interpretation of his writings, and made him great promises, which, however, were never fulfilled. In 1564 he again visited the Continent, in order to present a book which he had dedicated to the Emperor Maximilian. He returned to England in the same year, but in 1571 we find him in Lorraine, whither two physicians were sent by the queen to his relief in a dangerous illness. Having once more returned to his native country, he settled at Mortlake, in Surrey, where he continued his studies with unremitting ardour, and made a collection of curious books and manuscripts, and a variety of instruments, most of which were destroyed by the mob during his absence, on account of his supposed familiarity with the devil. In 1578 Dee was sent abroad to consult with German physicians and astrologers in regard to the illness of the queen. On his return to England, he was employed in investigating the title of the Crown to the countries recently discovered by British subjects, and in furnishing geographical descriptions. Two large rolls containing the desired information, which he presented to the queen, are still preserved in the Cottonian Library. A learned treatise on the reformation of the calendar, written by him about the same time, is still preserved in the Ashmolean Library at Oxford.

From this period the philosophical researches of Dee were concerned entirely with the pseudo-science of necromancy. In 1581 he became acquainted with Edward Kelly, an apothecary who professed to have discovered the philosopher's stone, and by whose assistance he performed various incantations, and maintained a frequent imaginary intercourse with spirits. Shortly after, Kelly and Dee were introduced to a Polish nobleman, Albert Laski, palatine of Stradz (Sieradz), devoted to the same pursuits, who persuaded the two friends to accompany him to his native country. They embarked for Holland in September 1583, and arrived at Laski's place of residence in February following. They lived for some years in Poland and Bohemia in alternately wealth and poverty, according to the credulity or suspicion of those before whom they exhibited. They professed to raise spirits by incantation. Kelly dictated their utterances to Dee, who wrote them down and interpreted them.

Dee, having at length quarrelled with his companion, quitted Bohemia and returned to England, where he was made chancellor of St Paul's Cathedral in 1594, and warden of Manchester College in 1595. He afterwards returned to his house at Mortlake, where he died in 1608, at the age of eighty-one.

His principal works are—Propositiones Mathematiche, Lond. 1558; Manus Dioptrischer, Antwerp, 1564; Epistolae ad Fredericum Commandemwnum, Ponsa, 1570, Preface Matematican to the English, Euclid, 1570; Divers Annotatizns and Inventions added to the second book of English Euclid, 1576; Epistola prospectus Dehthor viribus Jovaeus Fuld, a 1527, Parallelogram Mathematicum Fraenra
The catalogue of his printed and published works is to be found by Mr. Edmunson. In the letter to Bishop Whitgift, to which the reader is referred. A manuscript of Dr. De's, relating what passed for many years between him and some spirits, was edited by Mr. Elzeb. The Catalogue of Dr. John Dee, and the Catalogue of his Library of Manuscripts, edited by J. O. Halliwell, was published by the Camden Society in 1842.

Deed is a contract in writing, sealed and delivered by the party bound to the party benefited. Contracts or obligations under seal are called in English law specialties, and down to a recent date they took precedence in payment over simple contracts, whether written or not. Writing, sealing, and delivery are all essential to a deed. The signature of the party charged is not material, and the deed is not void for want of a date. Delivery, it is held, may be complete without the actual handing over of the deed. It is sufficient if the act of sealing were accompanied by words or acts signifying that the deed was intended to be presently binding, and delivery to a third person for the use of the party benefited will be sufficient. On the other hand, the deed must be handed over to a third person as an exchange (deeds), in which case it will not take effect as a deed until certain conditions are performed. Such conditional delivery may be inferred from the circumstances attending the transaction, although the conditions be not expressed in words. A deed indented, or indenture (so called because written in counterpart parts on a sheet of parchment, separated by cutting a wavy line between them), is between two or more parties who contract mutually. The actual indentation is not now necessary to an indenture. A deed-poll (without indentation) is a deed in which one party binds himself without reference to any corresponding obligations undertaken by another party. See Contract.

Deer (Cervidae), a family of Ruminant Artiodactyle Mammals, distinguished by the possession of deciduous branching horns or antlers, and by the presence of spots on the young. The antlers are borne by the frontal bone, and generally begin to appear towards the end of spring. At that season there is a marked determination of blood to the head, the vessels surrounding the frontal eminences become temporarily enlarged, and the budding horn grows with marvellous rapidity, the antler of a full-grown stag being produced in ten weeks. At first the horns are soft, vascular, and highly sensitive, and are covered with a delicate hairy integument known as the "velvet," amply provided with blood-vessels. On attaining their full growth the "burr," consisting of a ring of osseous tubercles as well as a layer of the horn, is formed and thereby pressing upon, gradually cuts off the blood-vessels which supply nutrition to the antlers. The velvet covering then begins to shrivel and to peel off, its disappearance being hastened by the deer rubbing its antlers against trees and rocks; while the grooves, which are seen to furrow the now exposed surface, mark the place of the former blood-vessels. With the single exception of the reindeer, antlers are confined to the male sex, and are fully developed at the commencement of the rutting season, when they are brought into use as offensive weapons of the sanguinary battles between the males for possession of the females. When the season of love is over they are shed, reappearing, however, in the following spring, and continuing to grow larger and heavier until the deer attains its full growth. Whether the deer inhabiting the warmer regions of the earth shed and renew their antlers every year has been a matter of considerable dispute, but in a recent work (Highlands of Central India) Forsyth states that he has convinced himself, from repeated observations, that in Indian deer this operation does not take place annually. In castrated animals the antlers either cease to appear or are merely rudimentary, while any influence whatever which disturbs the general system seems detrimental to their growth, as was observed in a case quoted by Darwin, where the antlers of a Wapiti deer, formed during a voyage from America, were singularly stunted, although the same individual afterwards, when living under normal conditions, produced perfect horns. Spots are common to the young of so many species of deer that they together, though fairly regarded as a family character. These spots persist through life in such forms as the Axi, or Spotted Deer (Axis maculata), but in the majority of species they altogether disappear in the adult form. Darwin considers that in all such cases the old have had their colour changed in the course of time, while the young have remained but little altered, and this he holds has been effected "through the principle of inheritance at corresponding ages." The lachrymal sinuses, or "tear pits," are present in most species of deer. This consists of a cavity beneath each eye, capable of being opened at pleasure, in which a watery substance of an disagreeable odour is secreted, the purpose of which is not yet clearly ascertained. "The bag round tears," which the contemplative Jacques watched, as they "Coursed one another down his innocent nose in pious chase," is Shakespeare's interpretation of the appearance presented by the motion of the glistening edges of the tear pits in the stag. The deer family comprises 8 genera and 52 species, distributed over all the great regions of the earth except the Ephesian, and living under the most diverse climatic conditions. Their total absence from Africa south of the Sahara may be due, as A. R. Wallace (Geographical Distribution of Animals) contends, to the presence in the past, as now, of a great belt of dry and desert country effectually preventing the immigration from Europe into Africa of such a forest-frequenting group as the deer, while favouring the introduction of antelope, which attain their greatest development in that region. They are also absent from Australia, although present in the Austral-Malayan region. The following are some of the more remarkable species.

The Red Deer or Stag (Cervus elaphus), the largest of the British deer, is a native of the temperate regions of Europe and Northern Asia, inhabiting dense forests, or frequenting moors and barren hill-sides as in Scotland. In England, where in feudal times it was protected by forest laws, which set greater value on the life of a stag than on that of a man, it was formerly abundant in all the royal forests. It is now almost extinct in that country, as well as in Ireland, in the wild state. In Scotland considerable herds are still to be found in the Highlands, and in several of the Western Isles, although, owing probably to the diminished extent of their feeding grounds, to the breeding in and in which takes place, and to the anxiety of deer-stalkers to secure the finest heads, the species is believed to be degenerating. The finest specimens in this country are found in the deer forests of Sutherlandshire, but these are inferior in size to those still obtained in the east of Europe. The antlers of the stag are rounded, and bear three "tines," or branches, and a crown consisting of three or more points. The points increase in number with the age of the creature, and when 12 are present it is known in Scotland as a "royal stag." This number, however, is sometimes exceeded, as in the case of a pair of antlers, weighing 74 lb., from a stag killed in Carpathia, which had 43 points. The antlers during the second year consist of a simple unbranched stem, to which a true or branch is added in each succeeding year, until the normal development is attained, after which their growth is somewhat irregular. The Red Deer is graceful, the females more so, their antlers being altogether absent from the males except at the rutting season, which begins about the end of September and lasts for three weeks. Dur-
The Wapiti Deer (Cervus canadensis) may be regarded as the representative of the stag in North America. It stands, however, a foot higher, and bears correspondingly heavier antlers. It occurs chiefly in Canada, where it feeds on grass and the young shoots of the willow and poplar. It has gained the reputation of being the most stupid of all cervine family, but this may have partly arisen from the peculiar noise it makes, corresponding to the "belling" of the stag, but in its case resembling very much the braying of an ass. Its flesh is coarse, and is held in little estimation by the Indians, owing to the excessive hardness of the fat. It thrives well in Britain, and would probably have been introduced had its venison been better.

The Fallow Deer (Dama vulgaris), a species semi-domesticated in Britain, where it forms a principal ornament in parks, still occurs wild in Western Asia, North Africa, and Sardinia, and in predynastic times appears to have abounded throughout Northern and Central Europe. It stands 3 feet high at the shoulders, and its antlers, which are cylindrical at the base, become palmed towards the extremity, the palming showing itself in the third year, and the antlers reaching their full growth in the sixth. The fur is of a yellowish-brown colour (whence the name "fallow"), marked with white spots; there is, however, a uniformly brown variety found in Britain, and said to have been brought by James I. from Norway on account of its hardness. The two varieties are said by Darwin to have been long kept together in the Forest of Dean, but have never been known to mingle. The bucks and does live apart during the pairing season, and the doe produces one or two, and sometimes three fawns at a birth. They are exceedingly fond of music, and a herd of twenty bucks were, it is said, brought from Yorkshire to Hampton Court, led by music from a bagpipe. They feed on herbage, and are particularly fond of horse chestnuts, which the males endeavour to procure by striking at the branches with their antlers.

The Roe Deer (Capreolus capreolus) is the smallest of the British Cervidae, a full-grown buck standing not more than 26 inches high at the shoulders. The antlers are short, upright, and deeply furrowed, and differ from those of the preceding species in the absence of a basal "tine." The horns, in short, as well as of the other members of the deer family, are largely employed in the manufacture of handles for cutlery, and the parings from these were formerly used in the preparation of ammonia, hence the name harts horn still applied to that substance. The Roe Deer inhabits the south of Britain, and is a shy and timorous creature, fleeing at the sight of man. This timidity, however, forsakes the male at the rutting season, and he will then attack whatever animal comes in its way. The antlers and hooves are his principal weapons, and with a single blow from the latter he has been known to kill a wolf. In North America the moose is tormented in the hot season by mosquitoes, and it is when rendered furious by the attacks of these insects that it can be most readily approached. The female seldom gives birth to more than two fawns, and with these she retires into the deepest recesses of the forest, the young remaining with her till their third year. The elk ranges over the whole of Northern Europe and Asia, as far south as East Prussia, the Caucasus, and North China, and over North America from the New England States westward to British Columbia. It was formerly common in the forests of Germany and France, and is still found in some parts of Sweden and Norway, where it is strictly protected. The elk, according to Lloyd, is easily domesticated, and was at one time employed in Sweden in drawing sledges. During winter it is frequently seen alone, but in summer and autumn it may be met with in small herds. In summer also it frequents moraines and low grounds, and takes readily to the water; in winter it retires to the shelter of the forests, where alone it can find suitable sustenance. Its flesh is considered excellent, and its tongue and nose are regarded as delicacies.

The Reindeer (Rangifer tarandus), the only domesticated species of deer, has a range somewhat similar to the elk, extending over the entire boreal region of both hemispheres, from Greenland and Spitzbergen in the north to

...ing this time the males go in search of the females, and are exceedingly fierce and dangerous. The period of gestation extends a few days beyond eight months, and the hind usually produces a single calf. The stag is remarkably shy and wary, and its sense of smell is exceedingly acute. In former times it was hunted with horse, hound, and horn, and such is still the practice in Devonshire and Ireland, but in Scotland the old method has been superseded by "stalking." A full grown stag stands about 4 feet high at the shoulders; its fur in summer is of a reddish-brown colour with a yellowish-white patch on the buttocks, in winter the fur is much thicker and of a grayish brown.

...superseded 'beaters, growing crops is considerable. In going to and from their accustomed paths, by the thicket, one of which the males endeavour to procure by striking at the branches with their antlers. The males are skilful at carrying off the females, and are readily taken by the sportsman takes advantage of this habit to waylay them. In hunting the roe deer, the deer are driven by the sportsman takes advantage of this habit to waylay them. In hunting the roe deer, the deer are driven by hunters, using horns and bells, and are shot down, as they speed along the accustomed paths, by the ambushed hunter. The species was until recently supposed to be monogamous, pairing in December, and the period of gestation only extending over five months. This supposition arose from the fact that the foetus in the doe was never found till January, and that then it was but slightly developed, although the sexes were known to seek the society of each other in July and August. From the investigations of Professor Bischoff of Giessen it appears that the true rutting season of the Roe Deer is in July and August; but that the ovum lies dormant until December, when it begins to develop in the normal way; the period of gestation is thus extended to nearly nine months. It was formerly abundant in all the wooded parts of Great Britain, but was gradually driven out, until in Pennant's time it did not occur south of Perthshire. Since then the increase of plantations has led to its partial restoration in the south of Scotland and north of England. It takes readily to the water, and has been known to swim across lochs more than half a mile in width.

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...The Elk or Moose Deer (Alces alces) is the largest of living Cervidae, its shoulders being higher than those of the horse. Its head measures 2 feet in length, and its antlers, which are broadly palmed, often weigh from 50 to 60 lb.; the neck is consequently short and stout. It is covered with a thick coarse fur of a brownish colour, longer on the neck and throat. Its legs are long, and it is thus unable to feed close to the ground—for which reason it browses on the tops of low plants, the leaves of trees, and the tender shoots of the willow and birch. Its antlers attain their full length by the fifth year, but in after years they increase in breadth and in the number of branches, until fourteen of these are produced. Although spending a large part of their lives in forests they do not appear to suffer much inconvenience from the great expanse of their antlers. In making their way among trees, the horns are carried horizontally to prevent entanglement with the branches, and so skilful is the elk that "he will not break or touch a dead twig when walking quietly." His usual pace, according to Lloyd (Field Sports), is a shambling trot; but when frightened he goes at a tremendous gallop. The elk is a shy and timorous creature, fleeing at the sight of man. This timidity, however, forsakes the male at the rutting season, and he will then attack whatever animal comes in its way. The antlers and hooves are his principal weapons, and with a single blow from the latter he has been known to kill a wolf. In North America the moose is tormented in the hot season by mosquitoes, and it is when rendered furious by the attacks of those insects that it can be most readily approached. The female seldom gives birth to more than two fawns, and with these she retires into the deepest recesses of the forest, the young remaining with her till their third year. The elk ranges over the whole of Northern Europe and Asia, as far south as East Prussia, the Caucasus, and North China, and over North America from the New England States westward to British Columbia. It was formerly common in the forests of Germany and France, and is still found in some parts of Sweden and Norway, where it is strictly protected. The elk, according to Lloyd, is easily domesticated, and was at one time employed in Sweden in drawing sledges. During winter it is frequently seen alone, but in summer and autumn it may be met with in small herds. In summer also it frequents moraines and low grounds, and takes readily to the water; in winter it retires to the shelter of the forests, where alone it can find suitable sustenance. Its flesh is considered excellent, and its tongue and nose are regarded as delicacies.

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Brunswick in the south. There are several well-marked varieties differing greatly in size, and in the form of the antlers—the largest forms occurring furthest north, while by many writers the American reindeer, which has never been domesticated, is regarded as a distinct species. The antlers, which are long and branching, and considerably palmed, are present in both sexes, although in the female they are more slender and less branched than in the males. In the latter they appear at a much earlier age than in any other species of deer, and Darwin conjectures that in this circumstance a key to their exceptional appearance in the female may be found. The reindeer has long been domesticated in Scandinavia, and is of indispensable importance to the Lapland race, to whom it serves at once as a substitute for the horse, cow, sheep, and goat. As a beast of burden it is capable of drawing a weight of 300 lb, while its fleetness and endurance are still more remarkable. Harnessed to a sledge it will travel without difficulty 100 miles a day over the frozen snow, its broad and deeply cleft hoofs being admirably adapted for travelling over such a surface. During summer the Lapland reindeer feeds chiefly on the young shoots of the willow and birch; and as at this season migration to the coast seems necessary to the well-being of the species, the Laplander, with his family and herds, squats for several months in the neighbourhood of the sea. In winter its food consists chiefly of the reindeer moss and other ichens, which it makes use of its hoofs in seeking for beneath the snow. The wild reindeer grows to a much greater size than the tame breed, but in Northern Europe the former are being gradually reduced through the natives entrapping and domesticating them. The tame breed found in Northern Asia is much larger than the Lapland form, and is there used to ride on. There are two distinct varieties of the American reindeer—the Barren Ground Caribou, and the Woodland Caribou. The former, which is the larger and more widely distributed of the two, frequents in summer the shores of the Arctic Sea, returning to the woods in autumn to feed on the tree and other ichens. The latter occupies a very limited tract of woodland country, and, unlike the Barren Ground Caribou, migrates southward in spring. The American reindeer travel in great herds, and being both unsuspecting and curious they fall ready victims to the bow and arrow of the cunning aborigines of the Indian, to whom their carcasses are the chief source of food, clothing, tents, and tools. Remains of the reindeer are found in caves and other Pleistocene deposits as far south as the south of France, that these species having been enabled to spread over Southern Europe, owing to the access of cold during the glacial period. It appears to have continued to exist in Scotland down to the 12th century.

The Musk Deer (Cervus musk) has its two pronged horns placed on permanent bony pedestals 3 inches in length, and the male is further furnished with long canines in the upper jaw. It is a native of Java, where it is occasionally seen in the enclosures of Europeans, but, coming as it does from Dr Horsfield, it is impetuous of confinement, and not fit for the same degree of domestication as the stag. Its flesh forms excellent venison. There are four species of musk-Deer inhabiting the forest districts from Madura to China, and southward to Java and the Philippine islands.

The Musk Deer (Mosca muschferus) differs from the us Deer in the absence of horns, and in the presence of the musk-bag, and it is now usually regarded as the type of distinct family—Muscada. The young, however, are often found in the Cerberus, and it is doubtful whether the differences already mentioned are sufficient to warrant its separation from the other deer. Canine teeth are present in the upper and lower jaws of both sexes, those in the upper jaw of the male being longest. It is native of the highlands of Central Asia from the Himalayas to Peking, being found at an elevation of 8000 feet, and in its habitat resembling such mountain species as the chamois. It is exceedingly shy and difficult of approach, and is hunted solely for its musk—an unctuous brown secretion, possessing a most penetrating and enduring odour, extremely disagreeable when present in large quantities, but forming a pleasant perfume when used sparingly. The substance is contained in a bag, almost the size of a hen's egg, situated on the abdomen, and secreted in greatest quantity during the rutting season. The hunters cut off the bag, and close the opening, and after drying, it is ready for sale.

Fossil Deer—Remains of many extinct species of deer belonging to existing genera have been found in Post-Pliocene and other recent deposits; while the remains of extinct genera occur in both hemispheres, and not extend further back than the Upper Miocene. The deer family, so far as yet discovered, is thus of comparatively recent origin, and is probably, as Mr Wallace suggests, an Old World group, which during the Miocene period passed to North America and subsequently to the southern continent. The best preserved species of fossil deer is the gigantic Irish Elk (Cervus giganteus). It is not a true elk, but is intermediate between the fallow deer and reindeer, and is found in great abundance and perfection in the lake deposits of Ireland. It occurs also in the Isle of Man, in Scotland, and in some of the English caverns. The antlers of a specimen of this species in Dublin weigh about 80 lb, and their span is twice that of the living elk. It appears to have been contemporaneous with the extinct mammoth and rhinoceros, but it is still doubtful whether it existed with man. In Kent's Hole, near Torquay, the base of an antler, partly gnawed, was found, and this, according to Owen, probably belonged to the most gigantic of our English cervine animals.

Defamation, saying or writing something of another, calculated to injure his reputation or expose him to public hatred, contempt, and ridicule. See Libel and Slander.

Defender of the Faith (Fides Defensa), a peculiar title belonging to the sovereign of England, in the same way that Catholicus belongs to the king of Spain, and Christianissimus to the king of France. Although certain charters have been appealed to in proof of an earlier use of the title, it appears to have been first conferred by Edward I. in 1291 for writing against Luther. It was afterwards confirmed by Clement VII. When Henry suppressed the religious houses at the time of the Reformation, the Pope not only deprived him of this designation, but also deposed him, in the thirty-fifth year of his reign, however, the title of "Defender of the Faith" was confirmed by Parliament, and has continued to be used by all his successors on the English throne.

Defand, Maria de Ych-Chamicon, Marquise du (1697-1760), a celebrated leader in the fashionable literary society of Paris during the greater part of the 18th century, was born in Burgundy of a noble family in 1697. Educated at a convent in Paris, she there displayed, along with great intelligence, the sceptical and cynical turn of mind which so well suited the part she was afterwards to fill in the philosophical circles of Paris. Her parents, alarmed at the freedom of her views, arranged that Madame du Defand should visit and reason with her, but this seems to have had little effect. They married her at twenty-one years of age to the Marquis du Defand without consulting her inclination. The union proved an unhappy one, and resulted in a speedy separation. Madame du Defand, young and beautiful, did not, according to the common belief, succeed in keeping herself uncontaminated by the abounding vice of the age, and it is said that she was for...
a time the mistress of the regent. She was afterwards reconciled to her husband, but it proved impossible for them to live together, and a second and final separation took place. Without heart and without enthusiasm, Madame du Defand was incapable of any strong attachment, but her intelligence, her cynicism, and her esperit made her the centre of attraction to a circle which included nearly all the famous philosophers and literary men indefatigable of Paris, besides a few distinguished visitors from abroad. In 1753 she became blind, and soon afterwards she took up her abode in apartments in the convent of St Joseph in the Rue St Dominique, which had a separate entrance from the street. This became the frequent resort of such men as Chateaubriand, Bouffars, Montesquieu, Voltaire, D'Alembert, David Hume, and Horace Walpole. In 1764 the society was split into two parties by the defection of her companion Mademoiselle de L'Espsas, who took with her D'Alembert and several others. Madame du Defand had most affability of nature with Horace Walpole, who paid several visits to Paris expressly for the purpose of enjoying her company, and who maintained a close and most interesting correspondence with her for fifteen years. She died on the 24th September 1780. Of her innumerable witty sayings probably the best, and certainly the best known, is her remark on the Cardinal de Polignac's account of St Denis's miraculous walk of two miles with his head in his hands.—"Il n'y a que le premier pas que le premier qui court." The correspondence of Madame du Defand with D'Alembert, Helvétius, Montesquieu, and others was published at Paris in 1789. Her letters to Horace Walpole, edited, with a biographical sketch, by Miss Berry, were published at London from the originals in Strawberry Hill in 1819.

DEFOE, DANIEL (1661-1731), was born in London in the year 1661, in the parish of St Giles, Cripplegate. Neither the exact date nor place of his birth is known; nor is his baptism recorded, probably because he was of a nonconformist family. Hardly anything is known of his ancestors, his grandfather, Daniel Foe, is said to have been a squire or wealthy yeoman at Elton, in Huntingdonshire (not Northamptonshire, as more generally stated), and to have kept a pack of hounds; but the authority for the former statement seems to be mainly traditional, and for the latter we have merely an anecdote in one of Defoe's newspaper articles, which is at least as likely to have been fiction as fact. Attempts have been made, but merely fanciful, to trace the name to Vaux, Eyvick, or Oldervuick, to Devereux. As to the variation Defoe or Foe it is to be noticed that its owner signed either indifferently till a late period of his life, and that his initials where they occur are sometimes D. F. and sometimes D. D. F. Mr Less conjectures, that the latter form originated in his being called Mr D. Foe to distinguish him from his father, seems not unlikely. It may be added that three autograph letters of his are extant, all addressed in 1705 to the same person, and signed respectively D. Foe, de Foe, and Daniel Defoe.

James Foe, the father of the author of Robinson Crusoe, was a butcher and a citizen of London. Of his mother nothing is known. Daniel was educating himself at a famous dissenting academy, Mr Morton's of Stoke Newington, where many of the celebrated nonconformists of the time were brought up. It is noteworthy that one of his schoolfellows suggested the unusual name of Crusoe. In after life Defoe frequently assented to the sufficiency of his education and the excellence of the methods observed by his teacher. Judging from his writings his stock of general information must have been far larger than that of most regularly educated men of his day; but it is probable that his attainments were in no particular line very exquisite or profound. With very few exceptions all the known events of Defoe's life are connected with authorship. In the older catalogues of his works two pamphlets, Speculum Crapocapronum (a satire on the clergy) and A Treatise Concerning the Turks, are attributed to him before the accession of James II., but there seems to be no reason why they should not be genuine. The name Defoe is certainly genuine before The Character of Dr Annasley, the family minister, published in 1697. He had, however, before this (if we may trust tradition) played an active part in public affairs. He had taken up arms in Monmouth's rebellion, and is supposed to have owed his lucky escape from the clutches of the king's troops to the, law, into which not a few of his schoolfellows fell, to the fact of his being a Londoner, and therefore a stranger in the west country. On January 26, 1688, he was admitted a liverrman of the city of London, having claimed his freedom by birth. Since his western escape he had taken to the business of wholesale hosery. At the entry of William and Mary into London he is said to have served as a volunteer trooper "galantly mounted and richly accoutred." In these days he lived at Tooting, and was instrumental in forming a dissenting congregation at that extent. His business pursuits appear to have been extensive and various. He would seem both now and later to have been a sort of commission merchant, especially in Spanish and Portuguese goods, and at some time or other he visited Spain on business. Later we hear him spoken of as a "cuent-cat merchant," but as he could hardly have kept a menagerie of these animals it is odd that no one has supposed that the cuent-cat was the sign of his place of business (it was a very usual one) rather than the staple of his trade. In 1692 his mercantile operations came to a disastrous close, and he failed for £17,000. By his own account the disaster would seem to have arisen from relying too much on credit. His misfortunes made him write both feelingly and forcibly on the bank, bankruptcy laws; and although his creditors accepted a composition, he afterwards honourably paid them in full, a fact attested by independent and not very friendly witnesses. Subsequently, he undertook first the secretarship and then the managemenship and chief ownership of some tileworks at Tilling, but here also he was unfortunate, and his imprisonment (of which more hereafter) in 1703 brought the works to a standstill, and thereby lost him £3000. From this time forward we hear of no settled business in which he engaged. He evidently, however, continued to undertake commissions, and made his political visits to Scotland an occasion for opening connections of this kind with that country. In the last thirty years of his life business played but a subordinate part, though he seems to have derived more profit from it than from his earlier ventures. It was probably at the time of his troubles in 1692 that he had occasion to visit Bristol, where—according to a local tradition—he lay perdu for fear of bailiffs all the week, but emerged in gorgeous raiment on Sunday, whence he was known by the nickname of the Sunday gentleman.

It was not as a business man that Defoe was to make his mark, though his business experiences coloured some of his literary productions to which he owed his fame. The course of his life was determined about the middle of the reign of William III. by his introduction (we know not how) to William himself and to other influential persons. He frequently boasts of his personal intimacy with the "glorious and immortal" king (epithets, by the way, to the invention of which he has considerable claim), and in 1695 he was appointed accountant to the commissioners of the glass duty, which office he held for four years. During this time he produced (January 1698) his Essay on Projects, one of the first and not the least noteworthy of his works. This essay contains suggestions on banks, road-management, friendly and insurance societies of every kind, the "improvement of the ancients," and the "building of the moderns," as said by the Turk. It contains suggestions on banks, road-management, friendly and insurance societies of every kind, the "improvement of the ancients," and the "building of the moderns," as said by the Turk.
military colleges, high schools for women, &c. It displays
Defoe's lively and lucid style in full vigour, and abounds
with original and picturesque ideas and apt illustrations, though it
illustrates also the unsystematized and ironical style of its
author. For the first time Defoe wrote the first of a long series
of pamphlets on the then burning question of occasional
comformity. In this, for the first time, he showed the
unluckily independent which, in so many other instances,
united all parties against him. On the one hand he pointed
out to the dissenters the scandalous inconsistency of their
playing fast and loose with sacred things, and on the other
he denounced the impropriety of requiring tests at all.
In direct support of the Government he published, towards
the close of the reign, a Defence of Standing Arms, against
Trenchard, and a set of pamphlets on the Partition
Treaty. Thus in political matters he had the same fate
as in ecclesiastical; for the Whigs were no more prepared
than the Tories to support William through thick and thin.
He also took a prominent part in the proceedings which followed the famous
Kentish petition, and was the author, and some say the
presenter, of the equally famous Legatus Memorial, which inserted in
the strongest terms the supremacy of the electors over the
elected, and of which even an irredeemable House of Commons did
dare not take any great notice. The theory of the
indeed in its supremacy of the freeholders of England, whose
delegates merely (according to this theory) the Commons
were, was one of Defoe's favourite political tenets, and he
returned to it in a most powerfully written tract entitled
The Original Power of the Collective Body of the People
of England Examined and Asserted. At the same time he
was occupied in a controversy on the conformity question
with the well-known John How (usually spelt Howe at
present), and wrote several minor political tracts.
The death of William was a great misfortune to Defoe,
and he soon felt the power of his adversaries. After
publishing The Mock Mourners, intended to_satire and
reprove the outbreak of Jacobite pay at the king's death, he
turned his attention once more to ecclesiastical subjects,
and, in an evil hour for himself, wrote the famous Shortest
Way with the Dissenters. The traditional criticism of this
remarkable pamphlet is a most curious example of the way
in which thoroughly inappropriate descriptions of books
pass from mouth to mouth. Every commentator (with
the single exception of Mr Chadwick) has dilated upon
its "exquisite irony." Now, the fact of the matter is, that
in The Shortest Way there is no irony at all, and, as
Defoe's adversaries so aptly remarked, irony would never
have been his, had the author got by the king's death, and, on
his return to the controversy, written new pamphlets in its
place. The pamphlet is simply an exposition in the plainest and most
forcible terms of an extreme the "high-flyers" position, and
every line of it might have been endorsed, and not
encouraged, by consent high-churchmen. The author's
object clearly was by this naked presentation to awaken
the dissenters to a sense of their danger, and to startle
moderate churchmen by showing them to what end their
favourite doctrines necessarily led. For neither purpose
was it necessary, we repeat, there
was none. Any lingering doubt from the consensus
of authority on the other side remains, let the student read
The Shortest Way and then turn to Swift's Modest Proposal or
his Reasons against Abolishing the Church of England.

He will soon see the difference. Ironical or not, however, it
was unlikely that the high-churchmen and their leader
Dr Beilby, the then Bishop of Nottingham (the Don Dunsin of Swift) would let such a
performance pass unnoticed. The author was soon
published, and as he abounded, an advertisement was
issued offering a reward for his apprehension, and giving us
the only personal description we possess of him, as "a
middle-aged spare man about forty years old, of a brown
complexion and dark brown-coloured hair, but wears a wig,
a hooked nose, a sharp chin, grey eyes, and a large mole
near his mouth." In this conjunction Defoe had really no
friends, for the dissenters were as much alarmed at his
book as the high-flyers were irritated. He surrendered,
and his defence appears to have been ineffectually
conducted, at any rate he was fined 200 marks, and condemned
to be pilloried three times, to be imprisoned indestructively,
and to find sureties for his good behaviour during seven
years. His sojourn in the pillory, however, was rather a triumph
than a punishment, for the populace took his side, and his
Hymn to the Pillory, which he soon after published, is one
of the best of his poetical works. Unluckily for him his
condemnation had the indirect effect of destroying his busi-
ness. He remained in prison until August 1704, and then
obeyed his release to the intercession of Harley, who repre-
sented his case to the queen, and obtained for him not only
liberty but pecuniary relief and employment, which, of one
kind or another, lasted until the termination of Anne's
reign. Defoe was uniformly grateful to the ministry, and
his language respecting him is in curious variance with that
generally used. There can be little doubt that, independ-
ently of gratitude, Harley's moderation in a time of the
extremest party-unwahy was no little recommendation to
Defoe. During his imprisonment the latter was by no
means idle. A spurious edition of his works having been
issued, he himself produced a collection of twenty-two
works, to which some time afterwards he added a second
of eighteen more. He also wrote in prison many
short pamphlets, chiefly controversial, published a curious
work on the famous storm of November 26, 1703, and started
perhaps the most remarkable of all his projects, The Raveen.
This was a paper which was issued during the greater
part of its life three times a week. It was entirely written
by Defoe, and extends to eight complete volumes and some
few scarce numbers of a second name. He did not allow himself to
newspapers, but threw his writing into the form of
something very like finished essays on questions of policy,
trade, and domestic concerns, while he also introduced a
so-called "Scandal Club," in which minor questions of
manner and manners were treated with a singu-
larly suggested the Tattler and Spectator which followed.
It is probable that if the five points of bulk, rapidity
of production, variety of matter, originality of design, and
excellence of style are taken together, hardly anybody
an author can show a work of equal magnitude. It is unlucky
that only one complete copy of the work is known to exist, and
that is in a private library. After his release he went
to Bury St Edmunds for change of air, though he did not
interrupt either his Raveen or his occasional pamphlets. One
of these, Gowing Ains a Charity, and Employing the
Gifts of the Poor in Service to the Nation, is for the time an
extraordinarily far-sighted performance. It denounces on the one hand
indiscriminate alms-giving, and on the other the folly of
national work shops, the institution of which on a pauci-
lar system had been proposed by Sir Humphry Mawchcock
in 1705: appeared The Conductor, or Memoirs of an
.

The Conductor, or Memoirs of Government

Voluntary and Unpaid Work among the Poor (in the first volume of
Travellers to the World in the Moon, a political
ature which is supposed to have given some hints for
Gulliver, and at the end of the year Defoe performed a
secret mission (as well of several of the kind) for Harley.)
While on one of these in the west of England he was molested, though with no serious result, by the zealous country justices. In 1705 also appeared the famous Mrs. Venet. As is well known, this admirable fiction is said to have been composed for a bookseller, to help off an unsaleable translation of Oeuvres sur la Mort. Mr. Lee, however, has thrown some doubts on this story. Defoe's next considerable work was The History of the Union, a poetical argument in some 10,000 terribly bad verses, and soon afterwards (1706) he began to be largely employed in promoting the union with Scotland. Not only did he write pamphlets as usual on the project, and vigorously recommend it in The Review, but in October 1706 he was sent on a political mission to Scotland by Godolphin, to whom Harley had recommended him. He resided in Edinburgh for nearly sixteen months, and his services to the Government were rewarded by a regular salary. He seems to have devoted himself to commercial and literary as well as to political matters, and prepared at this time his elaborate History of the Union, which appeared in 1709. In this latter year occurred the famous Sacheverel sermon, and Defoe wrote several tracts on the occasion. In 1710 Harley returned to power, and Defoe was placed in a somewhat awkward position. To Harley himself he was bound by gratitude and by a substantial agreement in principle; but with the rest of the Tory ministry he had no sympathy. He seems, in fact, to have agreed with the foreign policy of the Tories and with the home policy of the Whigs, and naturally incurred the reproach of time-serving and the hearty abuse of both parties. At the end of 1710 he again visited Scotland. In the negotiations concerning the Peace of Utrecht, Defoe strongly supported the ministerial side, to the intense wrath of the Whigs, and this wrath was displayed in an attempted prosecution against some pamphlets of his on the all-important question of the succession; but the influence of Harley saved him. He continued, however, to take the side of the dissenters in the questions affecting religious liberty, which played such a prominent part towards the close of Anne's reign. He naturally shared Harley's downfall; and, though the loss of his salary might seem a poor reward for his constant support of the Hanoverian claim, it was little more than his ambiguous, not to say trimming, position must have led him to expect. He was violently attacked on all sides, and at last published in 1715 an apologia entitled An Appeal to Honour and Justice, in which he defends his political conduct, and which furnishes us with the main authority for the details of his life. With this publication his political work was formerly supposed to have ended; but in 1734 six letters were discovered in the Record Office from Defoe to a Government official, Mr. Delafaye, which established the fact that in 1718 at least Defoe was doing not only political work, but political work of a somewhat equivocal kind—that he was, in fact, sub-editing the Jacobite Maha's Journal, under a secret agreement with the Government that he should tone down the sentiments and omit objectionable items. He seems to have performed the same not very honourable office in the case of two other journals—Donner's Letter and the Mercurius Politicus; and, if we may trust Mr. Lee, he wrote in these and other papers till nearly the end of his life.

However this may be, the interest of Defoe's life from this time forward is very far from political. He was now a man of fifty-five years of age; he had, up to this period, written nothing but what may be called occasional literature, and, except the History of the Union and the History of the Union and the adventures of Robinson Crusoe, by which his fame has been characterized for a century, nothing of importance is known of him. In 1715 appeared the first volume of The Family Instructor, which was subsequently continued, and which was very popular during the last century. Three years afterwards, the first volume of Robinson Crusoe. The first edition of this was published on the 23d of April 1719. It ran through four editions in as many months, and then in August appeared the second part; Twelve months afterwards the third part, or Serious Reflections, appeared. This last part is now hardly ever reprinted. Its connection, indeed, with the two former is little more than nominal, Crusoe being simply made the mouth-piece of Defoe's sentiments on various points of morals and religion. Meanwhile the first two parts were reprinted as an appendix to The Heautontimoroumenos, perhaps the earliest instance of the appearance of such a work in such a form. Crusoe was immediately popular, and various wild stories were set afloat of its having been written by Lord Oxford in the Tower, and of its being simply a piratical utilisation of Alexander Selkirk's papers. It is sufficient to say that all such stories are not only intrinsically of the wildest improbability, but also possess not a tittle of evidence in their favour. A curious idea, recently revived by the late Mr. F. Kingley, is, that the adventures of Robinson are allegorical and relate to Defoe's own life. This idea was certainly entertained to some extent at the time, and derives some colour of justification from words of Defoe's, but there seems to be no serious foundation for it. The book was almost immediately imitated; of such imitations I know of only one now known even by name. Contemporaneously with the later parts of Crusoe appeared The Dumb Philosopher, or Dickory Cronk. It is a short and rather dull book, of something the same type as the Serious Reflections.

In 1720 came forth The Life and Adventures of Mr. Dennis Campbell. This, unlike the two former, was not entirely a work of imagination, no more as its hero, the fortune-teller, was a real person. There are amusing passages in the story, but it is too desultory to rank with Defoe's best. In the same prolific year appeared two wholly or partially fictitious histories, each of which might have made a reputation for any man. The first was the famous Memoir of a Cavalier, which, as has been often repeated, Lord Chatham believed to be true history, and which Mr. Lee believes to be the embodiment at least of authentic private memoirs. It is more probable, however, that Defoe, with his extensive acquaintance with recent English history, and his astonishing power of working up details, was fallen into the task of its unassisted composition. As a model of historical work of a certain kind it is hardly surpassable, and many separate passages—accounts of battles and skirmishes—have never been equalled except by Mr. Carlyle. Captain Singleton, the last work of the year, has been unjustly depreciated by most of the commentators. The record of the journey across Africa, with its surprising anticipations of recent discoveries (anticipations which were commented on by Dr. Burnell in a paper read before the Bombay Branch of the Royal Asiatic Society in 1863, and which are probably due to Defoe's intercourse with Portugal) yields in interest to no work of the kind known to us; and the semi-piratical Quaker who accompanies Singleton in his buccaneering expeditions is a character thoroughly deserving of life. It may be mentioned that there is also a Quaker who plays a very creditable part in Roxana, and that Defoe seems to have been well affected to the Friends. In estimating this wonderful productivity on the part of a man sixty years old, it should be remembered that it was a habit of Defoe's to keep his works in manuscript sometimes for long periods. In 1721 nothing of importance was produced, but in the next twelvemonth three capital works appeared. These were The Fortunes and Misfortunes of Moll Flanders, The Journal of the Plague Year, and The History of Colonel Jack. Moll Flanders (as a whole) may be placed next to Robinson Crusoe in order of merit, or bracketed for.
position with the somewhat similar Roxana. Both triumphs of novel-writing. Each have subjects of other more than questionable character, but both display remarkable art with which Defoe handles such aspects. It is not true, as is sometimes said, that the difference of the two is the difference between gross and polished vice. The real difference is much more one of morals than of manner. Moll is by no means the lowest class. Notwithstanding the greater degradation which she falls, and her originally dependent position, she has been well educated, and has consorted with persons of gentle birth. She displays throughout much greater refinement of feeling than the more high-flying Roxana, and at any rate flesh and blood, if the flesh be somewhat ill and the blood somewhat hot. Neither of the two heroines has any but the rudiments of a moral sense; but both, in her original transgression and in her subsequent conduct, is actuated merely by avance and selfishness—vices which are peculiarly offensive in connection with her other failing, and which make her thoroughly abhorrent. The art of both stories is great, and as regards episode, Roxana of the daughter Susannah is complete, but the transitions are less natural in those in Moll Flanders. It is only fair to notice that the latter, according to Defoe’s more usual practice, allowed to repent and be happy, Roxana is brought to escape misery; Defoe’s morality, therefore, required no repugnance in one case than in the other. The end of the Plague Year, more usually called, from the second edition, A History of the Plague, has often been desired by those who have been called in one of the works he undertook, perhaps from the beginning, perhaps from the middle, or even to that of the latter, and fast asleep in bed, and then for a time lost his ill-gotten (though for his part he knows not the meaning of the word ill-gotten) gain. But great part of the book, and especially the latter portion, is dull, and in fact it may be generally remarked of Defoe that the conclusions of his tales are not equal to the beginning, perhaps from the restless indefatigability with which he undertook one work almost before finishing another. Roxana, or The Fortunate Mistress, already commented on, appeared in 1724; and in the same year came forth the first volume of A Tour through the whole Island of Great Britain, which was completed in the two following years. Much of the information in this was derived from personal experience, for Defoe claims to have made many more tours and visited about England than those of which we have record; but the large part must necessarily have been derived from collection. In 1725 appeared A New Voyage round the World, apparently entirely due to the author’s own fertile imagination and extensive reading. It is full of his peculiar varisamitude, and has all the interest of Anson’s or Dampier’s voyages, together with a charm of style superior even to that of the latter, and far beyond anything in the son-disant chaplain of the “Centurion” could attain to. The journey by land across South America is of especial interest, and forms an admirable pendant to the African travels in Singleton. In the same year Defoe wrote a curious little pamphlet entitled Everybody’s Business is Nobody’s Business, or Private Abuses Publick Grievances, exemplified in the Pride, Indecency, and Exorbitant Wages of our Women-Serants, Footmen, etc. This subject was a very favourite one with Defoe, and in the pamphlet he showed the immaturity of his political views by advocating legislative interference in these matters. Like all his work of this sort, however, it is extremely amusing reading. Towards the end of this same year The Complete English Tradesman, which may be supposed to sum up the experience of his business life, appeared, and its second volume followed two years afterwards. This book has been variously judged. It is generally and traditionally praised, but those who have read it will be more disposed to agree with Charles Lamb, who considers it “of a vile and deleterious tendency,” and thinks it “almost impossible to suppose the author in earnest.” It is certainly clear to those who know what our foreign critics mean by the reproach of “shop-keeping,” and the intolerable meanness advocated for the sake of the paltriest gain, the entire ignoring of any pursuit in life except money-getting, and the representation of the whole duty of man as consisting first in the attainment of a competent fortune, and next, when that fortune has been attained, in spending not more than half of it, are certainly repulsive enough. But there are no reasons for thinking the performance ironical or sarcastic, and it cannot be doubted that Defoe would have been honestly unable even to understand Lamb’s indignation. In 1706 came forth The Political History of the Devil. This is a curious book, partly explanatory of Defoe’s ideas on morality, and partly belonging to a series of symbolic works which he wrote, and of which the chief others are A System of Magic, and An Essay on the History of Apparitions. In all these works his treatment is on the whole rational and sensible, but in The History of the Devil he is somewhat hampered by an insufficiently worked-out theory as to the nature and personal existence of his hero, and the manner in which he handles the subject is an odd and not altogether satisfactory mixture of irony and earnestness. There are many very amusing things in the book, but to speak of its “extraordinary brilliancy and wit” (as Mr. R. Kingsley has done) is certainly inapposite. The works which have just been mentioned, together with A Plan of English Commerce, containing very enlightened views on export trade, appeared in 1727. During the twenty years from 1715 to 1728 Defoe had issued pamphlets and minor works too numerous to mention. The only one of them perhaps which requires special notice is Religious Courtship (1725), a curious series of dialogues displaying Defoe’s unaffected religiosity, and at the same time the raillery mingled intransiveness with which he applied his religious notions. This latter point was more flagrantly illustrated in one of his latest works, The Treatise concerning the Use and Abuse of the Marriage Bed (1727). This, which was originally issued with a much more offensive name, has been called “an excellent book with an improper title.” It might more properly be called an ill-judged work, with a title which gives fair warning of its contents. The Memoirs of Captain Carleton (1728) have been long attributed to Defoe. There is, however, a well-known anecdote of Johnson which makes this extremely unlikely; it is now known that an actual officer of the name did exist and serve, and the internal evidence is, we think, strongly against Defoe’s authorship. These Memoirs have been also attributed to Swift, with greater probability than as far as style is concerned. The Life of Mother Ross, reprinted in Bohn’s edition of Defoe, has no claim whatever to be considered his. There is little to be said of Defoe’s private life during this period. He must in some way or other have obtained a considerable income. In 1724 he built himself a large and
house at Stoke Newington (only pulled down about ten years ago), which had stables and grounds of considerable size. From the negotiations for the marriage of his daughter Sophia it appears that he had landed property in more than one place, and he had obtained on lease in 1722 a considerable estate from the corporation of Colchester. It was formerly thought that he soon got rid of this lease, but from documents in Mr. Lee's possession it seems that he only effected a mortgage upon it (afterwards paid off), and that it was settled on his unmarried daughter at his death. Other property was similarly allotted to his widow and remaining children, though some difficulty seems to have arisen from the misconduct of his son, to whom, for some purpose, the property was assigned during his father's lifetime, and who refused to pay what was due. There is a good deal of mystery about the end of Defoe's life; it used to be said that he died insolvent, and that he had been in jail shortly before his death. As a matter of fact, after great suffering from gout and stone, he died of a leatheny in Ropemaker's Alley, Moorfields, on Monday the 6th of April 1731, and was interred in the usual numerical almihitl! of God. He left no will, all his property having been previously assigned, and letters of administration were taken out by a creditor. How his affairs fell into this condition, why he did not die in his own house, and why in the previous summer he had been in hiding, as we know he was from a late correspondent, are points apparently not to be cleared up. The second period he held for three years held no communication. The character of Defoe, both mental and moral, is very clearly indicated in his works. He, the satirist of the true-born Englishman, was himself a model, with some notable variances and improvements, of the Englishman of his period. He saw a great many things, and what he did see he saw clearly. But there were also a great many things which he did not see, and there was often no logical connection whatever between his vision and his blindness. The most curious example of this inconsistency, or rather of this indifference to general principle, occurs in his Essay on Projects. He there speaks very briefly and slightly of life-insurance, probably because it was then regarded as impious by religious sects of his complexion. But on either side of this refusal are to be found elaborate projects of friendly societies and widows' funds, which practically cover, in a clumsy and roundabout manner, the whole ground of life-insurance. In morals it is evident that he was, according to his lights, a strictly honest and honourable man. But sentiment of any high-flying description (to use the exact word of his time) was quite incomprehensible to him, or rather never presented itself as a thing to be comprehended. He tells us with honest and simple prude that when his patron Harley fell out, and Godolphin came in, he for three years held no communication with the former, and seems quite incapable of comprehending the delicacy which would have obliged him to follow Harley's fallen fortunes. His very anomalous position in regard to Mist is also indicative of a rather blunt moral perception. One of the most affecting things in his novels is the heroic constancy and fidelity of the maid Amy to her exemplary mistress Roxana. But Amy, scarcely by her own fault, is drawn into certain breaches of certain grave moral laws which Defoe did understand, and she is therefore condemned, with hardly a word of pity, to a miserable end. Nothing heroic or romantic was within Defoe's view; he could not understand passionate love, ideal loyalty, aesthetic admiration, or anything of the kind; and it is probable that many of the little world tricks which delight us by their apparent satire were, as designed, not satire at all but merely a faithful representation of the feelings and ideas of the classes of which he himself was a unit. We have noticed Charles Lamb's difficulty as to The Complete Tradesman, and we think that the explanation we have preferred will extend to a great deal more of his work.

**Character.-**

The grounds upon which the last-mentioned writer bases his depreciation of others of Defoe's minor works are curious. 'He had undoubtedly a knack of making fiction look like truth, but is such a knack much desired? Is it not of the same sort as the knack who takes in the birds with his fruit?' Ac. Defoe's style is always inferior because of the close resemblance of the literary skill of writers of this class almost naturally to the current speech and manner of the nothing is really a greater triumph of art than similarity, and Macaulay has certainly made a mistake in confounding the marriage of his daughter Sophia it appears that he had landed property in more than one place, and he had obtained on lease in 1722 a considerable estate from the corporation of Colchester. It was formerly thought that he soon got rid of this lease, but from documents in Mr. Lee's possession it seems that he only effected a mortgage upon it (afterwards paid off), and that it was settled on his unmarried daughter at his death. Other property was similarly allotted to his widow and remaining children, though some difficulty seems to have arisen from the misconduct of his son, to whom, for some purpose, the property was assigned during his father's lifetime, and who refused to pay what was due. There is a good deal of mystery about the end of Defoe's life; it used to be said that he died insolvent, and that he had been in jail shortly before his death. As a matter of fact, after great suffering from gout and stone, he died of a leatheny in Ropemaker's Alley, Moorfields, on Monday the 6th of April 1731, and was interred in the usual numerical almihitl! of God. He left no will, all his property having been previously assigned, and letters of administration were taken out by a creditor. How his affairs fell into this condition, why he did not die in his own house, and why in the previous summer he had been in hiding, as we know he was from a late correspondent, are points apparently not to be cleared up. The second period he held for three years held no communication. The character of Defoe, both mental and moral, is very clearly indicated in his works. He, the satirist of the true-born Englishman, was himself a model, with some notable variances and improvements, of the Englishman of his period. He saw a great many things, and what he did see he saw clearly. But there were also a great many things which he did not see, and there was often no logical connection whatever between his vision and his blindness. The most curious example of this inconsistency, or rather of this indifference to general principle, occurs in his Essay on Projects. He there speaks very briefly and slightly of life-insurance, probably because it was then regarded as impious by religious sects of his complexion. But on either side of this refusal are to be found elaborate projects of friendly societies and widows' funds, which practically cover, in a clumsy and roundabout manner, the whole ground of life-insurance. In morals it is evident that he was, according to his lights, a strictly honest and honourable man. But sentiment of any high-flying description (to use the exact word of his time) was quite incomprehensible to him, or rather never presented itself as a thing to be comprehended. He tells us with honest and simple prude that when his patron Harley fell out, and Godolphin came in, he for three years held no communication with the former, and seems quite incapable of comprehending the delicacy which would have obliged him to follow Harley's fallen fortunes. His very anomalous position in regard to Mist is also indicative of a rather blunt moral perception. One of the most affecting things in his novels is the heroic constancy and fidelity of the maid Amy to her exemplary mistress Roxana. But Amy, scarcely by her own fault, is drawn into certain breaches of certain grave moral laws which Defoe did understand, and she is therefore condemned, with hardly a word of pity, to a miserable end. Nothing heroic or romantic was within Defoe's view; he could not understand passionate love, ideal loyalty, aesthetic admiration, or anything of the kind; and it is probable that many of the little world tricks which delight us by their apparent satire were, as designed, not satire at all but merely a faithful representation of the feelings and ideas of the classes of which he himself was a unit. We have noticed Charles Lamb's difficulty as to The Complete Tradesman, and we think that the explanation we have preferred will extend to a great deal more of his work.
Some peculiarities of that work follow as a natural corollary from those considerations. His political and economical pamphlets are almost unmatched as clear presentations of the views of their author. For driving the nail home no one but Swift excels him, and Swift perhaps only in "The Draper's Letters". There is often a great deal to be said against the view presented in those pamphlets, but Defoe saw nothing of it. He was perfectly fair but perfectly one-sided, being generally happily ignorant of everything which told against his own view.

The same characteristics are curiously illustrated in his moral works. The morality of these is almost amusing in its downright positive character. With all the Puntian eagerness to push a clear, uncompromising, Scripture-based distinction of right and wrong into the affairs of everyday life, he has a thoroughly English horror of crusade, and his clumsy canons consequently make wild work with the infinite intricacies of human nature. We have noticed, in remarking on *The Use and Abuse*, the worst instance of this blundering morality. Another, though very different instance, is his amusingly feminine indignation at the increased wages and embalmed diies of servants. He is, in fact, an incarnate instance of the tendency, which has so often been remarked by other nations in the English, to drag in moral distinctions at every turn, and to confound everything which is novel to the experience, uncanny to the taste, and incomprehensible to the understanding, under the general epithets of wrong, wicked, and shocking. His works of this class therefore are now the least valuable, though not the least curious of his books. His periodical publications fall to some extent under the same heading, and only deserve separate notice because of the novelty and importance of their conception. His poetry, as poetry, is altogether beneath criticism. It is sometimes vigorous, but its vigour is merely that of prose. Of his novels we have already spoken in detail, excepting, as universally known, *Robinson Crusoe*.

The earliest regular life and estimate of Defoe is that of Dr. Johnson in the *Biographia Britannica* (Chalmers Life, however, 1786), added very considerable information. In 1788 Mr. Walter Wilson wrote the book which we are strong upon the subject. It has been censured by political prejudices; it does not display any critical power of a high order, and it is in many parts rather a history of English letters than a life of Defoe; but it is a useful and important work. In 1826 appeared a life of Defoe by Mr. William Chadwick, an extraordinary rhapsody in a style which is half Cobbe and half Carlyle, but admirable for its fervour of sentiement. In 1864 the discovery of the six letters stirred Mr. William Lee to a new investigation, and the result of these was published (London, 1869) in three volumes. The first of these (well illustrated) contains a new life and particulars of the author's discoveries. The second and third contain fugitive writings assigned by Mr. Lee to Defoe for the first time. In many of these, however, we have no assurance but Mr. Lee's own impressions of style, &c., and consequently, though qualified judges will in most cases agree that Defoe may have written them, it cannot positively be stated that he did. Mr. Lee is equally curious of his reasons for attributing and denying many larger works to his author. His work, though full of research and in many ways useful in correcting and enlarging previous accounts of Defoe, has therefore been used with some caution. Besides the pamphlets devoted exclusively to Defoe and the book on the part of state; and, as he afterwards fled to Naples. In 1796, after an exile of three years, the establishment of the Directory allowed him to return to France. Finding himself, at the age of twenty-five, without a profession, he resolved to embrace the career of arms, and enlisted as a private in a cavalry regiment. About this time the Institute had proposed as a subject for an essay this question,—"What is the influence of symbols on the faculty of thought?" De Gérando gained the prize, and, hearing of his success after the battle of Zurich, in which he had distinguished himself. This literary triumph was the first step in his upward career. In 1799 he was attached to the ministry of the interior by Lucien Bonaparte; in 1804 he became general secretary under Champagny and, in 1805 he acquired the title of councillor of state; and in the following year he was appointed governor of Catalonia. On the overthrow of the empire, De Gérando...
was allowed to retain this office; but having been sent during the hundred days into the department of the Moselle to organize the defence of that district, he was punished at the second Restoration by a few months of neglect. He was soon after, however, readmitted into the council of state, where he distinguished himself by the prudence and conciliatory tendency of his views. In 1819 he opened at the law-school of Paris a class of public and administrative law, which in 1822 was suppressed by Government, but was re-opened six years later under the Martignac ministry.

In 1837 the Government acknowledged the long and important services which De Gerando had rendered to his country by raising him to the peerage. He died in Paris, November 9, 1842, at the age of seventy.

De Gerando's works are very numerous. That by which he is best known now, and which constitutes his chief title to posthumous fame, is his Histoire Comptes des Systèmes de Philosophie réellement aux principes des Connaissances Humaines, of which the first edition appeared at Paris in 1804, in 3 vols. 8vo. The germ of this work had already appeared in the author's Mémoire de la Génération des Connaissances: Humains, crowned by the Academy of Berlin, and published at Berlin in 1802. In this work De Gerando, after a rapid review of ancient and modern speculation on the origin of our ideas, singles out the theory of primary ideas, which he endeavours to combat under all its forms. The latter half of the work, devoted to the analysis of the intellectual faculties, is intended to show how all human knowledge is the result of experience, and reflection is assumed as the source of our ideas of substance, of unity, and of identity.

De Gerando's great work is divided into two parts, the first of which is purely historical, and devoted to an exposition of various philosophical systems; in the second, which comprises fourteen chapters of the entire work, the distinctive characters and value of these systems are compared and discussed. Great fault has been found with this plan, and justly, as it is impossible to separate advantageously the history and critical examination of any doctrine in the arbitrary manner which De Gerando has chosen for himself. Despite this disadvantage, however, the work has great merits. It brought back the minds of men to a due veneration for the great names in philosophical science,—a point which had been utterly neglected by Condillac and his school. In correctness of detail and comprehensiveness of view it was greatly superior to every work of the same kind that had hitherto appeared in France. During the Empire and the first years of the Restoration, De Gerando found time, despite his political avocations, to recast the first edition of his Histoire Comptes, of which a second edition appeared at Paris in 1823, in 4 vols. 8vo. The plan and method of this edition are the same as in the first; but it is enriched with so many additions that it may pass for an entirely new work. The last chapter of the part published during the author's lifetime ends with the revival of letters and the philosophy of the 15th century. The second part, carrying the work down to the close of the 18th century, was published posthumously by his son in four vols. (Paris, 1847)

Twelve-three chapters of this had been left complete by the author in manuscript; the remaining three were supplied from other sources, chiefly printed but unpublished memoirs.

The next valuable work of De Gerando was his essay Du perfectionnement moral et de l'éducation de soi-même, crowned by the French Academy in 1828. The fundamental idea of this work is that human life is in reality only a great education, of which perfection is the aim. Besides the works already mentioned, De Gerando left many others, of which we may indicate the following—Contra déviation des idées, Manuel des méthodes d'observation des peuples savants, 8vo, Paris, 1801;...
of the district attain a height of between 7000 and 8000 feet, one peak reaching an elevation of 8565 feet; the highest point of the Swálkík range is 3041 above sea-level. The principal passes through the Swálkík hills are the Turík pass, leading to the military station of Chakráta, and the Mohánd pass leading to the saltanums of Muscórco and Landur. The Ganges bounds the Dehra valley on the E.; the Jumna bounds it on the W. From a point about midway between the two rivers, and near the town of Dehra, runs a ridge which forms the water-head of the valley. To the west of this ridge, the water collects to form the Asán, a tributary of the Jumna; whilst to the east the Suswa receives the drainage and flows into the Ganges. To the east the valley is characterized by swamps and forests, but to the west the natural depressions freely carry off the surface drainage. Along the central ridge, the water-level lies at a great depth from the surface (228 feet), but it rises gradually as the country declines towards the great rivers. To meet the demand for water five canals have been constructed and fed by the hill streams. These canals have a total length of 67 miles, irrigate about 10,734 acres, and yield a net annual revenue of about £2300. Jaunár Báchvar, north of the valley, comprises a triangular hilly tract, situated between the Jumna and Jumna rivers near their point of confluence, and has an area of about 343 square miles. It is covered with forests of deciduous, fir, cypress, and oak.

The agricultural products consist of rice, manzhla (Eléusine coróccana), oil seeds, millets, vegetables, and garden crops, such as potatoes, turmeric, red pepper, &c. The method of cultivation in the valley does not differ from that adopted in the plains; but in Jaunár, the khn or jum system of cultivation is largely practised. This consists in burning and burning the undergrowth on the steep banks of ravines and hills, and in sprinkling the seed, chaffy millets, over the ashes. The process yields a good crop for about two years, when the site is abandoned. The principal industries are tea planting and cultivation, rice cultivation, and recently silk cultivation. The area under tea in 1872 was 2041 acres, yielding an out-turn of 297,828 lb., valued at £17,486.

The total revenue derived from Dehra district (exclusive of forests) in 1872-73 amounted to £119,169. Since 1872 the Dehra valley has been subject to the ordinary laws of other settled districts; but in the hilly division of Jaunár a less formal code is better suited to the people, and this tract is still "non-regulation." The fiscal arrangements of Jaunár are also peculiar. The tract is divided into khátas, each presided over by a sahpúra, or head-man. The sahpúras engage with the Government for the payment of the land revenue, and exercise police and civil jurisdiction in their respective khátas; whilst a committee of sahpúras, subject to the control of the British Superintendent of Dehra Dún, decide gravest disputes affecting one or more khátas. Education is progressing rapidly in the Dehra valley. Schools have also been established in Jaunár. Muscórco has Protestant missionary schools for European boys and girls; and similar institutions are maintained by Roman Catholic priests for members of that faith. It likewise forms the head-quarters of an active American mission. There is little crime in the district, and in Jaunár there are no regular police are found necessary.

The principal places in the district are Dehra, Muscórco, with the military cantonment of Landur, and the military station of Chakráta. Dehra town is the civil head-quarters of the district, and is constituted a municipality. It contained (1872) a total population of about 7000 souls, (5000 Hindus, and 2000 Mahometans). The municipal income is mainly derived from a house tax. Dehra is the head-quarters of the 2d Gurkha regiment, and of the Great Trigonometrical Survey. The district of Muscórco is a favourite summer resort. Its population varies according to the season of the year. During the winter months it is almost entirely deserted. Landur, the military depot for European convalescents, is really a portion of Muscórco. Chakráta is a hill station for a British regiment of infantry.

The census of 1872 returned the population of the entire district at 116,938 souls, of whom 102,811 were Hindus, 12,472 Mussulmans, 1061 Europeans, 191 Eurasians, and 469 native Christians. The Brahmanans numbered 10,529, Eoya or military caste 93,125, and traders 2048. The Brahmanans and Eoya chiefly belong to the several hill clans bearing these names. The Mahometan population consists principally of Pathans and Shákhás.

DEISM is the received name for a current of theological thought which, though not confined to one country, or to any well-defined period, had England for its principal source, and was most conspicuous in the last years of the 17th and the first half of the 18th century. The deists, differing widely in important matters of belief, were yet agreed in seeking above all to establish the certainty and sufficiency of natural religion in opposition to the positive religions, and in tacitly or expressly denying the unique significance of a supernatural revelation in the Old and New Testaments. They either ignored the Scriptures, endeavoured to prove them in the main but a helpful republication of the Evangelista, or directly impugned their divine character, their infallibility, and the validity of their evidences as a complete manifestation of the will of God. The term deism: not only used to signify the main body of the deists teaching, or the tendency they represent, but has of late e-politically come into use as a technical term for one specific metaphysical doctrine as to the relation of God to the universe, assumed to have been characteristic of the deists, and to have distinguished them from atheists, pantheists, and theists—the belief, namely, that the first cause of the universe is a personal God, but is not only distinct from the world but apart from it and its concerns.

The words deism and deist were treated as novelties in the polemical theology of the latter half of the 16th century in France, but were used substantially in the same sense as they were a century later in England. By the majority of those historically known as the English Deists, from Blount onwards, the name was owned and honoured. They were also occasionally called rationalists. Freedom (in Germany, Freiheit) is generally taken to be synonymous with deist, though obviously capable of a wider application, and as coincident with espírto, and with libertin in the original and theological sense of the latter word. Naturalists was a name frequently used of such as recognized no god but nature, of so-called Spaccastors, atheists, but both in England and Germany, in the 18th century, this word was more commonly and aptly in use for those who founded their religion on the lumen naturæ alone. The same men were not seldom assailed under the name of theists, the latter distinction between deists and deists, which stamped the latter word as excluding the belief in providence or in the immanence of God, was apparently formulated in the end of the 18th century by those rationalists who were aggrieved at being identified with the naturalists. The chief names amongst the deists are those of Lord Herbert (1581-1648), Blount (1654-1693), Tondal (1657-1753), Woolston (1669-1723), Toland (1670-1725), Shaftesbury (1671-1713), Bolingbroke (1678-1751), Collins (1676-1729), Morgan (I-1745), and Chubb (1679-1746). Annet, who died in 1676, and Goddall, who made his contribution to the controversy in 1742, are of less importance. Of the ten first named, none appear to have been born within twenty-five years of one another; and it is noteworthy that by far the greater part of the
literary activity of the deists, as well as of their voluminous opponents, falls within the same half century. The impetus that promoted a vein of thought cognate to deism were active both before and since the time of its greatest notoriety. But there are many reasons to show why, in the 17th century, men should have set themselves with a new zeal, in politics, law, and theology, to follow the light of nature alone, and to cast aside, to the utmost of their ability, the foils of tradition and prescriptive right, of positive codes, and scholastic systems, and why in England especially there should, amongst numerous freethinkers, have been not a few freewriters. The significance of the Copernican system, as the total overthrow of the traditional conception of the universe, dawned on all educated men. In physics, Descartes had prepared the way for the final triumph of the mechanical explanation of the world in Newton's system. In England the new philosophy had broken with time-honoured beliefs more completely than it had done even in France; Hobbes was more startling than Bacon. Locke's philosophy, as well as his theology, served as a school for the deists. Men had become weary of Protestant scholasticism; religious wars had made peaceful thinkers seek to take the edge off dogmatical rancour; and the multiplicity of religious sects provoked distrust of the common basis on which all founded. There was a school of distinctly latitudinarian thought in the Church of England, others not unnaturally thought it better to extend the realm of the adage "beyond the sphere of Protestant ritual or the doctrines of systematic divinity. Arminianism had revived the rational side of theological method. Semi-Arians and Unitarians, though sufficiently distinguished from the freethinkers by reverence for the letter of Scripture, might be held to encourage departure from the ancient landmarks. The scholarly labours of Huet, Simon, and Du Pana, and Clericuz, of Lightfoot, Spencer, and Prideaux, of Mill and Fell, furnished new materials for controversy; and the scope of Spinoza's Tractatus Theologico-Politicus had naturally been much more fully apprehended than ever his Ethica could be. The success of the English revolution permitted men to turn from the active side of political and theological controversy to speculation and theory; and curiosity was more powerful than faith. Much new ferment was working. The toleration and the free press of England gave scope. Deism was one of the results.

A great part of the deistical teaching was the same from first to last, but though deism cannot be said to have any marked development, it went through a sufficiently observable chronological growth.

Long ere England was ripe to welcome deistic thought, Lord Herbert earned the name "Father of Deism" by laying down the main line of that religious philosophy which in various forms continued ever after to be the backbone of deistic systems. He based his theology on a comprehensive, if insufficient, survey of the nature, foundation, limits, and tests of human knowledge. And amongst the divinely implanted, original, indefeasible notitias communis of the human mind, he found as foremost his five articles:—that there is one supreme God, that he is to be worshipped, that worship consists chiefly of worship and pious observances of our aim and cease from them, and that there are rewards and punishments here and hereafter. These truths, though oftenclouded, are found in all religions and at all times, and are the essentials of any religion—their universal prevalence being, along with their immanence, an unmistakable mark of their verity. Thus Herbert conceived religion of nature with his friend Grotius was doing for natural law,—making a new application of the standard of 'Vincentius, Quod semper, quod ubique, quod ab omniis.' Herbert had hardly criticised the Christian revelation either as a whole or in its details. Blount, a man of a very different spirit, did both, and in so doing may be regarded as having inaugurated the second main line of deistic procedure, that of historically-critical examination of the Old and New Testaments. Blount adopted and expanded Hobbes's arguments against the Mosaic authorship of the Pentateuch; and, mainly in the words of Burnet's Archaeologia Philosophica, he asserts the total inconsistency of the Mosaic Hexameron with the Copernican theory of the heavens, dwelling with emphasis on the impossibility of admitting the view developed in Genesis, that the earth is the most important part of the universe. He assumes that the narrative was meant ethically, not physically, in order to eliminate false and polemical notions; and he draws attention to that double narrative in Genesis which was elsewhere to be so fruitfully handled. The examination of the miracles of Apollonius of Tyana, professedly founded on papers of Lord Herbert's, is meant to suggest similar considerations with regard to the miracles of Christ. Naturalistic explanations of some of these are proposed, and a mythical theory is distinctly foreshadowed when Blount dwells on the inevitable tendency of men, especially long after the event, to discover miracles attendant on the birth and death of their heroes. Blount assaults the doctrine of a mediator as irreligious; and much more pronouncedly than Herbert he dwells on the view, afterwards regarded as a special characteristic of all deists, that much or most error in religion has been invented or knowingly maintained by sanguine men for the easier maintenance of good government, or in the interests of themselves and their class. And when he heaps suspicion, not on Christian dogmas, but on beliefs of which the resemblance to Christian tenets is sufficiently patent, the real aim is so transparent that his method seems to partake rather of the nature of literary eccentricity than of polemical artifice; yet by this disingenuous indirectness he gave his argument that savour of duplicity which ever after clung to the popular conception of deism.

Shaftesbury, dealing with matters for the most part different from those usually handled by the deists, stands almost wholly out of their ranks. But he showed how loosely he held the views he did not go out of his way to attack, and made it plain how little weight the letter of Scripture had for himself; and, writing with much greater power than any of the deists, he was held to have done more than any one of them to forward the cause for which they wrought. Founding ethics on the native and cultivable capacity in men to appreciate worth in men and actions, and associating the apprehension of morality with the apprehension of beauty, he makes morality wholly independent of scriptural enactment, and still more, of theological forecasting of future bliss or agony. He yet insisted on religion as the crown of virtues; and, arguing that religion is unanswerable from a high and holy enthusiasm for the divine plan of the universe, he sought the root of religion in feeling, not in accurate beliefs or meritorious good works. The theology of those was of little account with him, he said, who in a system of dry and barren notions "pay handsome compliments to the Duty, "expressed in a desire, ''an impatient devotion," and leave but "little of zeal, affection, or warmth in what they call rational religion." In the protest against the scheme of "judging truth by counting noses," Shaftesbury recognized the danger of the standard which seemed to satisfy many deists; and in almost every respect he has more in common with those who afterwards, in Germany, annihilated the pretence of complacency rationalism than with the rationalists themselves.

Toland, writing at first professedly without hostility to any of the received elements of the Christian faith, insists that Christianity was not mysterious, and that the valu
religion could not lie in any unintelligible element; though we cannot know the real essence of God or of any of his creatures, yet our beliefs about God must be thoroughly consistent with reason. Afterwards, Toland discussed, with considerable real learning and much show of candour, the comparative evidence for the canonical and apocryphal Scriptures, and demanded a careful and complete historical examination of the grounds on which our acceptance of the New Testament canon rests. He contributed little to the solution of the problem, but forced the investigation of the canon alike on the theologians and the reading public. Again, he sketched a view of early church history, further worked out by Semler, and surprisingly like that which, as elaborated by the Tubingen school, is still held with modifications by a large number of students of Christian antiquity. He tried to show, both from Scripture and extra-canonical literature, that the primitive church, so far from being an incorporeal body of believers with the same creed and customs, really consisted of two schools, each possessing its "own gospel" —a school of Ebionites or Judaizing Christians, and the more liberal school of Paul. These parties, consciously but amenable differing in their whole relation to the Jewish law and the outside world, were subsequently forced into a non-natural uniformity. The cogency of Toland's argument was weakened by his manifest love of paradox.

Collins, who had created much excitement by his Discourse of Free-Thinking, insisting on the value and necessity of unprejudiced inquiry, published at a later stage of the deistic controversy the famous argument on the evidences of Christianity. Christianity is founded on Judaism; its main prop is the argument from the fulfilment of prophecy. Yet an interpretation or re-arrangement of the text of Old Testament prophecies will secure a fair and non-allegorical correspondence between these and their alleged fulfilment in the New Testament. The inference is not expressly drawn. Collins indicates the possible extent to which the Jews may have been indebted to Chaldeans and Egyptians for their theological views, especially as great part of the Old Testament would appear to have been re-modelled by Ezra; and, after dwelling on the points in which the prophecies attributed to Daniel differ from all other Old Testament predictions, he states the greater number of the arguments still used to show that the book of Daniel deals with events past and contemporaneous, and is from the pen of a writer of the Maccabean period.

Woolston, at first to all appearance working earnestly in behalf of an allegorical but believing interpretation of the New Testament miracles, ended by assenting, with a yet unknown violence of speech, the absurdity of accepting them as actual historical events, and did his best to overthrow the credibility of Christ's principal miracles. The bitterness of his outspoken inquest against the clergy, against all precasters and priesthood, was a new feature in deistic literature, and injured the author more than it furthered his cause.

Tindal's aim seems to have been a sober statement of the whole case in favour of natural religion, with copious but moderately worded criticism of such beliefs and usages in the religions as he conceived to be either non-religious or directly immoral and unwholesome. The work in which he endeavoured to prove that true Christianity is as old as the creation, and is really the republication of the gospel of nature, soon gained the name of the "Deist's Bible."

Morgan criticised with great freedom the moral character of the persons and events of Old Testament history, developing the theory of conscious "accommodation" on the part of the leaders of the Jewish church. This accommodation of truth, by altering the form and substance of it to meet the views and secure the favour of ignorant and bigoted contemporaries, Morgan attributes also to the apostles and to Jesus. He likewise expands at length a theory of the origin of the Catholic Church much like that sketched by Toland, but assumes that Paul and his party, latterly at least, were distinctly hostile to the Judaical party of their fellow-believers in Jesus as the Messiah, while the college of the original twelve apostles and their adherents viewed Paul and his followers with suspicion and disfavour. Persecution from without Morgan regards as the influence which mainly forced the antagonistic parties into the commonwealth of the catholic and orthodox church. Annæ made it his special work to invalidate belief in the resurrection of Christ, and to discredit the work of Paul.

Chubb, the least learnedly educated of the deists, did more than any of them, save Herbert, to round his system into a logical whole. From the New Testament he sought to show that the teaching of Christ substantially concides with natural religion as he understood it. But his main contention is that Christianity is not a doctrine but a life, not the reception of a system of truths or facts, but a pious effort to live in accordance with God's will here, in the hope of joining him hereafter. Chubb dwells with special emphasis on the fact that Christ preached the gospel to the poor, and argues, as Tindal had done, that the gospel must therefore be accessible to all men without any need for learned study of evidences for miracles, and intelligible to the meanest capacity.

Dodwell's ingenious thesis, that Christianity is not founded on argument, was certainly not meant as an aid to faith, and, though its starting-point is different from all other deistical works, it may safely be reckoned amongst their number.

Though himself contemporary with the earlier deists, Bolingbroke's principal works were posthumously published after interest in the controversy had declined. His whole strain, in sharp contrast to that of most of his predecessors, is cynical and satirical, and suggests that most of the matters discussed were of small personal concern to himself. He gives fullest scope to the ungenerous view that a vast proportion of professedly revealed truth was ingeniously palmed off by the more cunning on the more ignorant for the convenience of keeping the latter under. But he writes with truth keenness and vigour, and knows well how to use the materials already often taken advantage of by earlier deists.

In the substance of what they received as natural religion, the deists were for the most part agreed, Herbert's articles continued to contain the fundamentals of their theology. Religion, though not identified with morality, had its most important outcome in a faithful following of the eternal laws of morality, regarded as the will of God. With the virtuous life was further to be conjoined a humble disposition to adore the Creator, avoiding all fictitious forms of worship as worse than useless. The small value attributed to all outward and special forms of service, and the want of any sympathetic craving for the communion of saints, saved the deists from attempting to found a free-thinking church, a creedless communion. They seem generally to have inclined to a quietistic accommodation to established forms of faith, till better times came. They steadfastly sought to eliminate the miraculous from theological belief, and to expel from the system of religious truth all debatable, difficult, or mysterious articles. They aimed at a rational and intelligible faith, profoundly in order to make religion, in all its width and depth, the heritage of every man. They regarded with as much suspicion the notion of a "peculiar people" of God, as of a unique revelation, and insisted on the salvability of the heathen. They rejected the doctrine of the Trinity, and protested against mediatorship, atonement, and the implied righteousness of Christ, always laying more stress on the teach-
ing of Christ than on the teaching of the church about him; but they repeatedly laid claim to the name of Christians or of Christian deists. Against superstitution, fanaticism, and priestcraft they were incessantly lifting up their testimony. They all recognized the soul of man—not regarded as intellectual alone—as the ultimate court of appeal. But they varied much in their attitude towards the Bible. Some were content to argue their own ideas into Scripture, and those they disliked out of it; to one or two it seemed a satisfaction to discover difficulties in Scripture, to point to historical inaccuracies and moral defects. Probably Chubb's position on this head is most fairly characteristic of deism. He holds that the narrative, especially of the New Testament, is in the main accurate, but, as written after the events narrated, has left room for misunderstandings and mistakes. The apostles were good men, to whom, after Christ, we are most indebted; but they were fairly entitled to their own private opinions, and naturally introduced these into their writings. The epistles, according to Chubb, contain errors of fact, false interpretations of the Old Testament, and sometimes disfigurement of religious truth. Fortunately, however, the points on which the private opinions of apostolic men might naturally differ most widely, such as the doctrine of the Logos, are matters which have nothing to do with the salvation of souls.

The general tendency of the deistical writings is sufficiently self-consistent to justify a common name. But it is vain to speak of deism as a compact system, or to regard it as the outcome of any one line of philosophical thought. Of matters generally regarded as pertaining to natural religion, that on which they were least agreed was the certainty, philosophical demonstrability, and moral significance of the immortality of the soul, so that the deists have sometimes been grouped into "mortal" and "immortal" deists. For some the belief in future rewards and punishments was an essential of religion; some seem to have questioned the doctrine as a whole; and, while others made it a basis of morality, Shaftesbury protested against the ordinary theological form of the belief as immoral. No two thinkers could well be more opposed than Shaftesbury and Hobbes; yet sometimes ideas from both were combined by the same writer. Collins was a pronounced necessitarian; Morgan regarded the denial of free will as tantamount to atheism. And nothing can be more misleading than to assume that the belief in a Creator, even apart from the work of his hands, as a defeasibility of the characteristic of the deists as a body. In none of them is any theory on the subject specially prominent; save in their denial of miracles, of supernatural revelation, and a special redemptive interposition of God in history, they seem to have thought of providence much as the mass of their opponents did. Herbert starts his chief theological work with the design of vindicating God's providence. Shaftesbury vigorously protests against the notion of a wholly transcendent God. More than once expresses a theory that would now be pronounced one of immanence. Toland, the inventor of the name of pantheism, was notoriously, for a great part of his life, in some sort a pantheist. And while as thinkers they diverged in their opinions, so too the deists differed radically from one another in their character, in reverence for their subject, and in religious earnestness and moral worth.

The deists were not powerful writers; none of them was distinguished by wide and accurate scholarship; hardly any was either a deep or comprehensive thinker. But though they generally had the best scholarship of England against them, they were bold, acute, well-informed men; they appreciated more fully than their contemporaries not a few truths now all but universally accepted; and they seemed therefore entitled to leave their mark on subsequent theological thought. Yet while the seed they sowed was taking deep root in France and in Germany, the English deists, the most notable men of their time, were soon forgotten, or at least ceased to be a prominent factor in the intellectual life of the century. The controversies they had provoked collapsed rather than were finally settled; and deism became a by-word even amongst those who were in no degree anxious to appear as champions of orthodoxy.

The fault was not wholly in the subjectivism of the movement. But the subjectivism that founded its theology on the "common sense" of the individual was accompanied by a fatal pseudo-universalism which, cutting away all that was peculiar, individual, and most intense in all religions, left in any one of them but a lifeless form. A theology consisting of a few vague generalities was sufficient to sustain the piety of the best of the deists; but it had not the concreteness or intensity necessary to take a firm hold on those whom it emancipated from the old beliefs. The negative side of deism came to the front, and, communicated with fatal facility, seems ultimately to have constituted the deism that was combated by the narrow-minded at the clubs of the wis and the tea-tables of polite society. But the intense religious life before which deism fell was also a revolt against the abstract and argumentative orthodoxy of the time.

That the deists appreciated fully the scope of difficulties in Christian theology and the sacred books is not their most noteworthy feature; but that they made a stand, sometimes cautiously, often with outspoken fearlessness, against the presupposition that the Bible is the religion of Protestants. They themselves gave way to another presupposition equally fatal to true historical research, though in great measure common to them and their opponents. It was assumed by deists in debating against the orthodox, as it is now by orthodox Protestants in contending against the Romish Church, that the flood of error in the hostile camp was due to the benevolent cunning or deliberate self-seeking of unscrupulous men, held to by the ignorant with the obstinacy of prejudice.

Yet deism deserves to be remembered as a strenuous protest against bibilolatry in every degree and against all traditionalism in theology. It sought to look not a few facts full in the face, from a new point of view and with a thoroughly modern, though unhistorical spirit. It was not a religious movement; it was, as a defiance of the accepted theology, its character was mainly theological, the deistical crusade was to the history of the church, or of dogma, but to the history of general culture. It was an attitude of mind, not a body of doctrine; its nearest parallel is probably to be found in the eclectic stances of the Renaissance philosophy and the modernizing tendencies of Calvinist humanism. The controversy was assumed to be against prejudice, ignorance, obscurantism; what monks were to Erasmus the clergy as such were to Woulston. Yet English deism was in many ways characteristically English. The deists were, as usually happens with the leaders of English thought, no class of professional men, but represented every rank in the community. They made their appeal in the mother tongue to all men who could read and think, and sought to reduce the controversy to its most direct practical issue, making it turn as much as possible on hard facts or the data of common sense. And, with but few exceptions, they avoided wildness in their language as much as in the general scheme of theology they proposed. If at times they had recourse to antiquity of speech and veiled polemics, this might be partly excused by the death of Aikinhead on the scaffold, and Woulston's imprisonment.
French deism, the direct progeny of the English movement, was equally short-lived. Voltaire was to the end a daedal scholar of the school of Bolingbroke; Rousseau could have claimed knaved with the nobler deists. Diderot was for a time heartily in sympathy with deistic thought; and the Encyclopedia was in its earlier portion an organ of deism. But as Locke's philosophy became in France sensationalism, and as Locke's sceptical question, restated by Collinas, how we know that the divine power might not confer thought on matter, led the way to dogmatic materialism, so deism soon gave way to forms of thought more directly and extremely subversive of the traditional theology.

In Germany there was a native free-thinking theology nearly contemporary with that of England, where it was greatly developed and supplemented. The compact rational philosophy of Wolff nourished a theological rationalism which in Heimrath was wholly undistinguishable from dogmatic deism, while, in the case of the historic-critical school to which Semler belonged, the distinction is not always easily drawn—although these rationalists professedly recognized in Scripture a real divine revelation, mingled with local and temporary elements. It deserves to be noted here that the former, the theology of the Anflarung, was likewise the deists, devoted to a short-sighted notoriety, whereas the solemn, accurate, and scholarly researches of the rationalist critics of Germany, undertaken with no merely polemical spirit, not only form an epoch in the history of theology, but have taken a permanent place in the body of theological science. 

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The rationalists' scrutiny of the city and church orthodoxy on the other, many seem to cling to a theology nearly allied to deism. Rejecting miracles and denying the infallibility of Scripture, professing a Calvinistic view of the ultimate grace and having no hope in evangelistic Arminianism, the faith of such inquiry seems fairly to coincide with that of the deists. Wherever religious indifferention is rife, the less generous forms of deism are still alive. And even some cultured theologians, the historical representatives of lattudinarianism, seem to accept the great body of what was contended for by the deists, though they have a fuller appreciation of the power of spiritual truth, and a truer insight into the ways of God with man in the history of the world.

The deists displayed a singular incapacity to understand the true conditions of history; yet amongst them there were some who pointed the way to the truer, more generous interpretation of the past. When Shaftesbury wrote that "religion is still a discipline, and progress of the soul towards perfection," he gave birth to the same thought that afterwards hailed in Lessing's Erziehung des Menschen, taischthe as the dawn of a fuller and a purer light on the story of religion and on the development of the spiritual life of mankind.


DEJANIRA, the wife of Hercules. See HERCULES.

DEKKER, JEREMIAS DE (1610-1666), a Dutch poet, was born at Dant in 1610. He received his entire education from his father, a native of Antwerp, who, having embraced the reformed religion, had been compelled to take refuge in Holland. Entering his father's business at an early age, he found leisure to cultivate his taste for literature and especially for poetry, and to acquire without assistance a competent knowledge of English, French, Latin, and Italian. His first poem was a paraphrase of the Lamentations of Jeremiah (Klageliedern von Jeremias), which was followed by translations and imitations of Horace, Juvenal, and other Latin poets. The most important of his original poems were a collection of epigrams (Puntdichter) and a satire in praise of avarice (Lof der Geldlichkeit). The latter is his best known work. Written in a vein of light and yet effective irony, it is usually ranked by critics along with Erasmus's Lof der Geldlichkeit.

DEKKER, Thomas, dramatist. It is impossible to make out, from the scanty records of Dekker's personal life, what manner of man he was. His name occurs frequently in Henslowe's Diary during the last year of the 16th century, he is mentioned there as receiving loans and payments for writing plays in conjunction with Ben Jonson, Chettle, Haughton, and Day, and he would appear to have been then in the most active employment as a playwright. The titles of the plays on which he was engaged from April 1599 to March 1599-1600 are Tristan and Iseult, Orestes Furens, Aysenwona, The Stepmother's Tragedy, Birt a Brown, Punge of Plymouth, Robert the Second, Poetin's Tragedy, The Shoemaker's Holiday, Truth's Supplcation to Candlelight, The Spanish Moor's Tragedy, The Seven Wise Masters. At that date it is evident that Dekker's services were in great demand for the stage. He is first mentioned in the Diary two years before, as having sold a book, the payments in 1599 are generally made in advance, in carded work to be done. In the case of the above three plays, Orestes Furens, Truth's Supplcation, and the Shoemaker's Holiday, Dekker is paid as the sole author. Only the Shoemaker's Holiday has been preserved; it was published in 1600. It would be unsafe to argue from the character of parts of some of these plays that Dekker was then a young man from the university, who had come up like so many others to make a living by writing for the stage. Classical knowledge was then in the air, playwrights in want of a subject were content with translations, if they did not know the originals. However educated, Dekker was then a young man just out of his teens, if he spoke with any accuracy when he said that he was three-score in 1637, and it was not in scholarly themes that he was destined to find his true vein. The call for the publication of the Shoemaker's Holiday, which deals with the life of the city, showed him where his strength lay. To give a general idea of the substance of Dekker's plays, there is no better way than to call him the Dickens of the Elizabethan period. The two men were as unlike as possible in their habits of work, Dekker having apparently all the thriftlessness and impecunious shamelessness of Micawber himself. Dekker's Bohemianism appears in the slightness and hurry of his work, a strong contrast to the thoroughness and rich completeness of every labour with which Dickens applied himself; perhaps also in the exquisite freshness and sweetness of his songs, and the natural charm of his touches of expression and description in his plays. But he was like Dickens in the bent of his genius towards the representation of the life around him in
London, as well as in the humorous kindliness of his way of looking at that life, his vein of sentiment, and his eye for odd characters. There is a passage in Ben Jonson's caricature of Dekker under the name of "Crispinus,"—an allusion to his Shoemaker's Holiday,—from which it would appear that Dekker prided himself on his powers of observation. The less is included in the greater; the random pickings of Dekker, hopping here and there in search of a subject, gave less complete results than the more systematic labours of Dickens. Dekker's Simon Eyre, the good-hearted, mad shoemaker, and his Orlando Friscolado, are touched with a kindly humour in which Dickens would have delighted; his Infelices, Fiammettas, Tornielias, even his Baltimoreans, have a certain likeness in type to the heroines of Dickens; and his roaring blades and their gulls are prototypes of Sir Mulberry Hawk and Lord Frederick Versupoth. Only there is this great difference in the spirit of the two writers, that Dekker wrote without the smallest apparent wish to reform the life that he saw, and Jonson only wished it; and in the life he so fed, as he from his dramatist's necessity of finding interesting matter, he cast his eye about rather with a liking for the discovery of good under unpromising appearances than with any determination to detect and expose vice. The observation must also be made that Dekker's personages have much more individual character, more of that mixture of good and evil which we find in real human beings. Hack-writer though Dekker was, and writing often under sore pressure there is no dramatist whose personages have more of the breath of life in them; drawing with easy, unconstrained hand, he was a master of those touches by which an imaginary figure is brought home to us as a creature with human interests. A very large part of the motive power in his plays consists in the temporary yielding to an evil passion. The kindly philosophy that the best of natures may be for a time perverted by passionate desires is the chief animating principle of his comedy. He delights in showing woman listening to temptation, and apparently yielding, but still retaining sufficient control over themselves to be capable of drawing back when on the verge of the precipice. The wives of the citizens were his heroines, pursued by the unlawful addresses of the gay young courtiers; and on the whole Dekker, from inclination apparently as well as policy, though himself, it seems, a voluptuous man, Jonson's satire had any point, a bit of a dandy in his youth, took the part of those touches by which an imaginary figure is brought home to us as a creature with human interests. And the scenes, the interiors of the shops and the houses, the tastes of the citizens and their wives, the tavern and tobacco-shop manners of the youthful aristocracy and their satellites. The social student cannot afford to overlook Dekker; there is no other dramatist of that age from whom we can get such a vivid picture of contemporary manners in London only he exhibits it; and in his life so fed, as he from his dramatist's necessity of finding interesting matter, he cast his eye about rather with a liking for the discovery of good under unpromising appearances than with any determination to detect and expose vice. Dekker's powers as a dramatist, while on the contrary the Unrushing of the Humorous Poet is full of pungent ridicule of Jonson's style, and of retorts and insults conceived in the happiest spirit of good-natured mockery. Dekker has been accused of poverty of invention in adopting the characters of the Poetaster, but it is of the very path of the jest that Dekker should have set on Jonson's own foul-mouthed Captain Tucca to abuse Horace himself. Dekker's plays were published in the following order:—The Shoemaker's Holiday, 1604; The London Assurance, 1661; Satiromastix, 1662; Patient Grissel (in conjunction with Chettle and Haughton) 1663; The Honest Whore (Part 1) 1694; The Whore of Babylon, 1607; Westward Ho! Northward Ho! and Sir Thomas Wyatt (in conjunction with Webster) 1607; The Roaring Girl (in conjunction with Middleton), 1611; If it be good, the Devil was in it, 1612; The Forlorn Hope (written with Massinger), 1629, Match Me vs London, 1631; The Wonder of a Kingdom, 1638; The Sun's Darling (not published till 1656); and The Witch of Edmonton (written in conjunction with Rowley and Ford), 1658. An edition of the collected dramatic works of Dekker is published by John Pearson. Some of his prose tracts, of which he wrote many, are repeated by the Shakespeare Society, notably The Seven Deadly Sins of London and The Gull's Hornbook.

DE LA BECHE, HENRY THOMAS (1796-1855), one of the band of enthusiastic workers by whom the science of geology was developed so rapidly in England during the early part of this century, was born in the year 1796. His father, an officer in the army, possessed landed property in Jamaica, but died while his son was still young. The boy accordingly spent his youth with his mother among the interesting and picturesque coast cliffs of the south-west of England, where probably he early imbibed that love for geological pursuits, and cultivated that marked artistic faculty, to which in large measure he owed the high position he ultimately reached. When fourteen years of age, being destined, like his friend Murchison, for the military profession, he entered the college at Great Marlowe, where he amicably distinguished himself by the rapidity with which he executed sketches showing the salient
features of a district. But this aptitude, which would have been of great service in a soldier’s life, was not called forth for warlike purposes. The peace of 1815 changed the career of many young seamen for military distinction, and among them was De la Beche. Instead of pursuing the calling he had chosen, he began to devote himself to the increasing saliency of the pursuit of geology. When only twenty-one years of age he joined the Geological Society of London, continuing throughout life to be one of its most active, useful, and honoured members. Possessing a fortune sufficient for the gratification of his tastes, he visited many localities of geological interest in Britain, and spent some time on the Continent studying features in the geology and physical geography of France and Switzerland. His journeys seldom failed to bear fruit in suggestive notes, papers, or sketches. Early attachment to the south-west of England led him back to that region, where, with augmented power from enlarged experience and reflection, he began the detailed investigation of the rocks of Cornwall and Devon. Thrown much into contact with the mining community of that part of the country, he conceived the idea that the nation ought to compile a geological map of the United Kingdom, and collect and preserve specimens to illustrate, and perhaps even to aid in further developing, its mineral industries. He showed his skilful management of affairs by inducing the Government of the day to recognize his work and give him an appointment in connection with the Ordnance Survey. This formed the starting-point of the present Geological Survey of Great Britain and Ireland. Year by year increasing stores of valuable specimens were transmitted to London, for De la Beche enlisted the sympathy and co-operation of the mining authorities of Cornwall and Devon. At last the building where the young Museum of Economic Geology was placed became too small. But De la Beche, having seen how fruitful his first idea had become, determined to use all his persuasiveness to prevail on the authorities not merely to provide a large structure, but to widen the whole scope of the scientific establishment of which he was the head, so as to impart to it the character of a great educational institution where practical as well as theoretical instruction should be given in every branch of science necessary for the conduct of mining work. In this he was again successful. Parliament sanctioned the erection of a museum in Jermyn Street, London, and the organization of a staff of professors with laboratories and other appliances. The establishment was opened in 1851. The Geological Survey also, which had grown up under his direction among the mining authorities of Cornwall and Devon, received a new organization and an increase to its staff. To De la Beche belongs the high praise of having entirely originated and developed this important branch of the public service. Many foreign countries have since formed geological surveys avowedly based upon the organization and experience of that of the United Kingdom. The British colonies, also, have in many instances established similar surveys for the development of their mineral resources, and have had recourse to the parent survey for advice and for officers to conduct the operations.

Delacroix the elder died at Bordeaux when Eugene was seven years of age, and his mother returned to Paris and placed him in the Lycée Napoléon. Afterwards, on his determining to be a painter, he entered the atelier of Baron Guérin, who affected to treat him as an amateur. His fellow-pupil was Scheffer, who was alike by temperament and antecedents the opposite of the audaciously Delacroix, and the two remained antagonistic to the end of life. Delacroix’s acknowledged power and yet want of success with artists and critics—Thiers being his only advocate—perhaps mainly resulted from his bravura and rude dash in the use of the brush, at a time when smooth roundness of surface was general. His first important picture, Dante and Virgil, was painted in his own studio, and when Guérin went to see it he flew into a passion, and told him his picture was absurd, detestable, exaggerated. “Why ask me to come and see this! you know what I say.” Yet his work was received at the Salon, and produced an enthusiasm of debate (1829). Some said Géricault had worked on it, but all treated it with respect. Still in private his position, even after the larger tragic picture, the Massacre of Scipio, had been deposited in the Luxembourg by the Government, became that of an Ishmaelite “the war for the freedom of Greece then going on moved him deeply, and his next two pictures—Marino Faliero Decapitated on the Giant’s Staircase of the Ducal Palace (which has always remained a European success), and Greece Lamenting on the Ruins of Missolonghi—with many smaller works, were exhibited for the benefit of the patriots in 1826. This exhibition was much visited by the public, and next year he produced another of his important works, Sardanapalus, from Byron’s drama. After this, he says, “I became the abomination of painting, I was referred to water and salt.”—but, he adds with singularly happy naïveté, “J’étais enchanté de mon même !” The patronage he inherited, or, perhaps it should be said, what remained of it, was 10,000 livres de rente, and with economy he lived on this, and continued the expensive process of painting historical pictures. In 1831 he reappeared in the Salon with six works, and immediately after left for Morocco, where
DELAINDRE, Jean Baptiste Joseph (1749-1829), an eminent mathematician and astronomer, was born at Amiens, September 19, 1749. He commenced his studies in the gymnasium of that town under the celebrated poet Delille, with whom he maintained an intimate friendship till his death. Having obtained an exhibition founded by one of his ancestors for the benefit of the town of Amiens, he was enabled to prosecute his studies for a time at the Collège du Plessis in Paris. The expiry of this privilege, however, left him to struggle with great privations. During the interval in which he was awaiting funds, the youth he devoted himself to historical and literary studies. He undertook extensive translations from Latin, Greek, Italian, and English, and at the same time entered on the study of the mathematical sciences. For about a year he supported himself by teaching at Compiegne. On his return to Paris in 1771 he obtained the situation of tutor in the family of D'Assy, the receiver-general of finance. By this time he had resolved to give himself specially to the study of physics and astronomy.

At the College of France he attended the lectures of Lalande, on whose works he had even at that time made a complete commentary. This was first remarked when, in the course of instruction, an occasion presented itself of estimating from memory a passage of Aratus. Lalande immediately intrusted to him the most complicated astronomical calculations, and prevailed on D'Assy to establish an observatory at his house, whose Delambre applied himself to astronomical observations. In 1781 the discovery of the planet Uranus by Herschel led the Academy of Sciences to propose the determination of its orbit as the subject of one of its annual prizes. Delambre undertook the formation of tables of its motion, and the prize was awarded to him. His next effort was the construction of solar tables and tables of the motions of Jupiter and Saturn. He took part in the sitting of the Academy of Sciences when Laplace communicated his important discoveries on the inequalities of Jupiter and Saturn, and he formed the design of applying the results of that profound analysis to the completion of tables of the two planets. Delambre turned his attention more especially to the satellites of Jupiter—an undertaking of great difficulty and extent. He had been engaged several years in the composition of his spherical tables, when the Academy of Sciences offered a prize for the subject, which was awarded to him. In the same year (1793) he was elected a member of the Academy.

Immediately afterwards he was appointed, along with Míchelin, by the French section of the joint English and French commission to measure an arc from Dunkirk to Barcelona as a basis for the metric system. This undertaking, in itself laborious, was rendered highly dangerous to the personal safety of those engaged in it by the events of the Revolution. Míchelin died whilst the work was proceeding, and its successful termination in 1799 was due to the ability and the prudence of Delambre. A full and interesting account of the work was published in his *Règles du Système Métrique Décimal* (3 vols 1796-10), for which he obtained, by a unanimous vote, the prize awarded by the National Institute of France to the most important work in physical science of the preceding ten years.

Delambre, who had been chosen as an associate of almost every scientific body in Europe, was appointed in 1795 a member of the French Board of Longitude, and in 1803 perpetual secretary for the mathematical sciences in the Institute. In 1807 he succeeded Lalande in the chair of astronomy of the College of France, and he was appointed one of the principal directors (titulaires) of the university.
For twenty years he performed faithfully and impartially the duties of his office in one of the classes of the Institute. His annual reports, his historical Éloge, which have been published, and his exposition of the progress of science are eminently distinguished by profound erudition, literary skill, and, above all, by generous appreciation of the work of others. His literary and scientific labours were very numerous, and, in respect of excellence, of the highest order. His History of Astronomy, published at intervals, and forming when complete six quarto volumes, is a work of prodigious research. It puts the modern astronomer in possession of all that had been done, and of the methods employed by those who lived before him.

His Méthodes Analytiques pour la Désertmination d'un Arc du Méridian, has numerous memoirs in the additions to the Connaissance des Tems, and his Astronomie Théorique et Pratique exhibit the finest applications of modern analysis to astronomy and geography.

It is a remarkable fact that Delambre did not apply himself to astronomical observations until he had reached the comparatively late age of thirty-five. He was appointed a member of the Royal Council of Public Instruction in 1814, but he lost the place in 1815. He was in Paris when it was taken by the allied armies, and, in a letter written at that time to a friend and pupil, he says that on the day of the siege, in the library of the commandant, he laboured with tranquillity in his study from eight in the morning till midnight. He had a happier fate than Archimedes in a like position, for he was not molested by the victors, and no one was billeted on him, probably from respect to his high reputation. At the creation of the Legion of Honour in 1802 Delambre was made a member of that order. He was appointed chevalier of St Michael in 1817, an officer in the Legion of Honour in 1821, but a long time before, he had been created an hereditary chevalier, with an endowment, which was decreed as a national reward.

The life of continued and hard study which Delambre led at last affected his health. The disease by which he was cut off became apparent in the month of July 1822. His total loss of strength, with frequent and long continued fainting-fits, gave warning of a fatal result, which occurred on the 19th August 1822.

The following is a list of his works which appeared separately:
- Tables de Jupiter et de Saturne (1799), Tables du Soleil, de Jupiter, et de Saturne, d'autres Tables de Jupiter, parmi lesquelles il y a une édition à l'usage de l'Observatoire de Landan (1792), Méthodes Analytiques pour la Désertmination d'un Arc du Méridian (1790), Tables des Planètes, par Borda, recensées et publiées par J. Delambre (1800), Tables du Soleil, publiées par la Bureau des Longitudes (1806), Bas du Systèm Métrique Int. 1c (3 vols in 4to, 1806-1818), Rapport Historique sur les Progrés des Sciences Mathématiques depuis 1799, etc. (1810), Abri de l'Astronomie, ou Leçons Élémentaires d'Astronomie Théorique et Pratique, in 4to, Astronomie Théorique et Pratique (3 vols in 4to, 1814), Tables Éphémères des Satellites de Jupiter (1817), Histoire de l'Astronomie Ancienne (2 vols in 4to, 1817), Histoire de l'Astronomie Moderne (1822, 2 vols in 4to), Histoire de l'Astronomie au Dix-huitième siècle (1 vol, 1827).

In addition to these, he published a very considerable number of memoirs (about 28) on various points of astronomy to the Connaissance des Temps, beginning with the year 1798. He also contributed to the Memoirs of the Academy of Stockholm, St Petersburg, Berlin, and Turin, and to those of the first class of the French Institute, and he composed éloges on many of his contemporaries at their deaths.

DE LA RIVE, AUGUSTE (1801-1873), a Swiss physicist, distinguished chiefly for his researches on the subject of electricity, was born at Geneva on the 9th October 1801. He belonged to a good family closely connected with that of the Count Cavour, and he inherited his taste for natural science from his father, an eminent physician and chemist. After an unusually brilliant career as a student, he was appointed at the early age of twenty-two to the chair of natural philosophy in the Academy of Geneva. For some years after his appointment he devoted himself specially to the investigation of the specific heat of gases, and to observations for determining the temperature of the earth's crust. In the latter inquiry he availed himself of an artegon well that had been bored to a depth of 700 feet, and his observations were adopted by Poussin as the basis of his calculations. The comparatively new subject of electricity, however, received much of his attention from the first, and it gradually became the chief object of his scientific work. His name is associated with original discoveries in connection with magnetism, electro-dynamics, the condition of magnetism with electricity, the properties of the soliwale arc, and the passage of electricity through extremely purified media. His researches on the last-mentioned subject led him to form a new theory of the aurora borealis, which, though not free from difficulties, is on the whole the most probable explanation of a very obscure phenomenon. The most valuable practical result of his scientific discoveries was the process of electro-gilding carried out by Messrs. Elkington & Roelfz from a memoir which he communicated to the Académie des Sciences. By making it known in this way he voluntarily renounced all the profits of his discovery. Between 1835 and 1838 De la Rive published several complete treatises on the subject of astronomy to the memoirs of the learned societies of Europe. In 1842 he received the grand prize of 3000 francs from the Académie des Sciences for his discovery of the electro-gilding process, and in 1846 he received the highest honour open to the scientific men of Europe in the nomination of one of the eight foreign associates of the Academy. De la Rive's birth and fortune gave him considerable social and political influence. He was distinguished for his hospitality to literary and scientific men, and for his interest in the welfare and independence of his native country. In 1860, when the inauguration of the Savoy and Nice had led the Genevese to fear French aggression, De la Rive was sent by his fellow-citizens on a special embassy to England, and succeeded in securing a declaration from the English Government, which was communicated privately to that of France, that any attack upon Geneva would be regarded as a case master selected the occasion of this visit the University of Oxford conferred upon De la Rive the honorary degree of D.C.L. When on his way to pass the winter at Cannes he died suddenly at Marseilles, on the 26th November 1873.

DELABRÈCHE, HIPPOLYTE, commonly known as Paul (1797-1856), one of the most accomplished painters of the eclectic modern school, was born in Farn, 17th July 1797. He is always spoken of as one of the most fortunate and successful of men, as well as one of the ablest, since he never appeared to encounter any obstacles or to feel any difficulties.

The father of Delacroix was an expert who had made a fortune, to some extent, by negotiating and cataloguing, buying and selling. He was proud of his son's talent, and able to forward his artistic education. The master selected was Gros, then painting life-like histories, and surrounded by many pupils. In this atelier Delacroix met Bonington (an English youth of whose work we see little, but who has had a very considerable influence in France), Rouquier, Bellange, Eugène Lami, and others. In no haste to make his first exhibited picture was a large one, Josseley saving Josas, 1822. This picture led to his acquaintance with Bertault and Delacroix, with whom he remained on the most friendly terms, the three...
forming the central group of a numerous body of historical painters, such as perhaps never before lived in one locality and at one time. From 1822 the record of his life is to be found in the successive works coming from his hand. He visited Italy in 1838 and 1843, when his father-in-law, Horace Vernet, was director of the French Academy. His studio in Paris was in the Rue Mazarine, where he never spent a day without some good result; his hand being sure and his knowledge great. His subjects, definitely expressed and popular in their manner of treatment, illustrating certain views of history dear to partisans, yet romantic in their general interest, were painted with a firm, solid, smooth surface, which gave an appearance of the highest finish. This solidity, found also on the canvas of Vernet, Schefer, Leopold Robert, and Ingres, was the manner of the day. It repudiates the technical charm of texture and variety of handling which the English school inherits as a tradition from the time of Reynolds; but it is more easily understood by the world at large, since a picture so executed depends for its interest rather on the history, scene in nature, or object depicted, than on the execution skill, which may or may not be critically appreciated. We may add, that his point of view of the historical characters which he treated is not always just, whatever self-command he attempted to be excused by. His dramatic work was so pathetic that criticism feels hard-hearted and with a certain antique perfection of form, but not informed by any wonderful or profound expression. The portrait figures are nearly all unexceptionable and admirable. This great and successful work is on the wall itself, an inner wall however, and is executed in oil. It was finished in 1841, and considerably injured by a fire which occurred in 1855, which injury he immediately set himself to remedy; but he died before he had well begun, on the 4th November 1856. Robert Fleury finished the repairs, and the picture as yet shows no sign of decay.

Personally Delaroché exercised even a greater influence than by his works. Though short and not powerfully made, he impressed every one as rather tall than otherwise; his physiognomy was accentuated and firm, and his fine forehead gave him the air of a minister of state. (W. B. Sc.)

DELARUE, Gervais (1751-1835), a French historical investigator, and one of the chief authorities on Norman and Anglo-Norman literature. He was a native of Caen, received his education at the university of that town, and was ultimately raised to the rank of professor. His first historical enterprise was interrupted by the French Revolution, which forced him to take refuge in England; but the interruption was the less to be regretted as he found the fullest encouragement from his northern compatriots, and had the opportunity of examining a vast mass of original documents in the Tower and elsewhere, which proved of the utmost assistance to his investigations. In the preface to the second volume of his greatest work—the Essais historiques—he speaks feelingly of the kindness he had experienced, and mentions his supreme gratification at receiving the approval of Sir Walter Scott. From England he passed over to Holland, still in prosecution of his favourite task; and there he remained till 1798, when the way was open for his return to France. The rest of his life was spent in his native town, where he was chosen principal of his university. While in England he had been elected a member of the Society of Antiquaries, and in other parts of his own country he was made a corresponding member of the Institute, and was enrolled in the Legion of Honour.

Bendes numerous articles in the Memoires of the Royal Society of London, the Memoires de l'Institut, the Memoires de la Societe d'Agricole de Caen, and in other periodical publications. He published separately Essais historiques sur les Bardes, les Jongleurs, et les Trouvères normands et anglo-normands, 3 vols. 1834, and Recherches historiques sur la Prunerie de Caen, 1837, and since his death has appeared Memoires historiques sur le palais de Caen, 1841; Recherches sur la tapisserie de Bayeux, 1841; and Nouveaux essais historiques sur la ville de Caen, 1842. In his writings he displays a strong partiality for everything Norman, and vates the Norman influence on French and English literature as of the very highest moment.
DE LA VIGNE

JEAN FRANÇOIS CARMIN (1793–1843), French poet and dramatist, was born April 4, 1793, at Havre, whence his father sent him at an early age to Paris, there to be educated at the Lycée Napoléon. During the first years of his attendance at this school he was little else than a dullard, but on reaching the age of fourteen he seems to have undergone a complete change—sagacity gave place to unusual faculty in the acquisition of knowledge; a decided taste for literary studies, especially poetry, was evinced; and he quickly became a distinguished student. He read with avidity all the poets, great and small, to whose works access was obtainable, and was known to spend many an hour snatched from school duties in the elaboration of his own juvenile pieces. Constitutionally of an ardent and sympathetic temperament, with a mind the natural intelligence of which was quickened by extensive miscellaneous reading, and by contact with a world then in a state of revolutionary ferment, it will be seen that Delavigne had much in his favour when he first sought popular applause. An opportunity for display soon presented itself. On the 26th of March 1811 the Emperor Marie Louise gave birth to a son, christened in his very cradle king of Rome. This long-desired event was hailed with the utmost satisfaction, congratulations reached Napoleon from every quarter of Europe, and fifty millions of human beings did homage to their future sovereign. But the poets were dumb. Our young aspirant to fame, therefore, seeing the field unoccupied, composed a festal hymn. It was completely successful; even the critics were pleased. On being shown the verses, Andrieux, albeit a man little disposed to flatter, exclaimed, "Bring him to me! He shall make nothing but verses, and these, I hope, good ones." Encouragement such as this augured well for the future; but Delavigne’s purse was scantily furnished, and his friends were poor and unable to render any assistance. At this point he was fortunate in securing as a patron Count François of Nantes, who attached him to the revenue office, but with the single proviso, that he should not trouble himself to appear at his post oftener than once a month.

About this time he competed twice for a university prize, but without success. A victory, however, was at hand. Amid the throes in which society laboured at the period of Napoleon’s downfall, Delavigne, catching inspiration from the mingled hopes and fears which agitated his fellow-countrymen, burst upon the world with two impassioned poems, the first entitled Waterloo, the second, Déclaration du Musée, both written in the heat of patriotic enthusiasm, and teeming with popular political allusions. A third, but of inferior merit, Sur le besoin de s’ouvrir après le désastre des étrangers, was afterwards added. These stirring pieces, termed by him Messtennons, sounded a key-note which found an echo in the hearts of all. Twenty-five thousand copies were sold, Delavigne was famous. Nor was his reputation made solely with the populace; his verses were the subject of much discussion in court circles; and in spite of their political tone it was thought necessary to bestow upon him some mark of attention. He was therefore appointed to an honorary librarianship, with no duties to discharge. Thus he was fortunately rendered independent by the offer of one sinecure just as he was deprived of another, for his intercourse with Françaix had now ceased.

Having achieved so signal a triumph in one department of literature, Delavigne was desirous of attaining distinction in another, and accordingly brought out upon the stage a play well-known under the title of Les Vêpres Siciliennes. The manuscript having been refused at the Théâtre-Français, the critic of which, a supercilious poet, told him that he might write comedy very fairly, the mortified author, like Voltaire on a similar occasion, cast the sheets into the flames, from which they were rescued by his brother Germain. A better fate than burning awaited the piece, and in 1819 it was performed at the Odéon, then just rebuilt. On the night of the first representation, which was warmly received, Picard, the manager, threw himself into the arms of his elated friend, exclaiming: “You have saved us! You are the founder of the second French Theatre.” This was followed up by the production of the Comédie (1820), a poor play, with little plot, and the Paria (1821), with still less, but containing some well-written choruses. The latter piece obtained a longer lease of life than its intrinsic literary merits warranted, on account of the popularity of the political opinions freely expressed in it—so freely expressed, indeed, that the displeasure of the king was incurred, and Delavigne lost his post. But the duke of Orleans, willing to gain the people’s good will by complimenting their favourite, wrote to him as follows:—

“The thunder has descended on your house; I offer you an apartment in mine.” Accordingly he became librarian at the Palais-Royal, a position retained during the remainder of his life. It was here that he wrote the École des Villardas, which gained his election to the Academy in 1825. To this period also belong La Princesse Aurélié (1828), and Marino Faliero (1829), a drama in the romantic style.

For his success as a writer Delavigne was in no small measure indebted to the stirring nature of the times in which he lived. The Messereaux, which first introduced him to universal notice, had their origin in the excitement consequent on the occupation of France by the allies in 1815. Another crisis in his life and in the history of his country, the revolution of 1830, stimulated him to the production of a second masterpiece, La Fausse Muse. This song, set to music by Aubert, was on the lips of every Frenchman, and rumbled in popularity the celebrated Marseillaise. A companion piece, La Vierge aurore, was written for the Foiles, by whom it was sung on the march to battle.

Other works of Delavigne followed each other in rapid succession—Don Juan d’Autriche (1835), Une Famille au temps du Luther (1836), La Populaire (1838), La Ville du Coq (1839), Le Conseiller (1840), and Charles VI. (1843), an opera partly written by his brother.

But the poet had reached the acme of his reputation, and was now on the decline. In 1845 he quitted Paris to seek in Italy the health his labours had cost him. At Lyons his strength altogether gave way, and on the 11th of December, while listening to his wife, who read aloud one of Scott’s novels, he gently expired, murmuring some verses.

By many of his own time Delavigne was looked upon as unsurpassed and unsurpassable. Every one bought his works; nay more, every one read them. If a new play of his was announced at the theatre, it was the affair of a month to secure a seat. Talma and Mademousselle Mars felt honoured in receiving from him a part; theatrical managers lay in wait for the fruits of his pen. But the applause of the moment was gained at the sacrifice of lasting fame. Delavigne wrote but for the hour; he was too little the retired, contemplative poet, and too much the busy man of the world. In the region of politics alone does he shine, when he quits his niche is to descend to the level of utter common-place. But as a writer Delavigne had many excellencies. He is never at a loss for language, yet expresses himself in a terse and vigorous style. The poet of reason rather than of imagination, he recognizes his own province, and is rarely tempted to flights of fancy beyond his powers. He wrote always as he would have spoken, from sincere conviction.
Delaware, near the present town of Lewes, which they named Paradise Point. Here they made a purchase from the Indians of all the land on the west side of the river, from Cape Henlopen, at the mouth of the bay, to Trenton Falls; and as none of the Swedes understood the Indian language, the deeds were written in Dutch, and sent to Sweden for present. The first settlement the Swedes made in their newly acquired country, which they called New Sweden, was near the Delaware River, where the Christian and Brandywine Creeks flow, and where the city of Wilmington now stands. Here they built a fort, which they called Christians. The Dutch had a few weak settlements on the Jersey shore, but they also claimed the west bank of the river, and wrote a remonstrance to Menew, though they did not, perhaps could not, interfere with the colony, which the English government for three years, appointing at his death a successor. The Dutch proved troublesome neighbours, and as a retaliation for the build-

It is bounded on the N. by Pennsylvania, on the W. and S. by Maryland, and on the E. by the Atlantic Ocean, and Delaware Bay. It is nine by

On the 28th of August 1609 Henry Hudson sailed into the Delaware Bay, but, finding the water shallow and difficult to navigate, he made no exploration, leaving that honour to the Dutch navigators,—Hendrick Hudson in 1609, and in 1633 Bay and Christian.—In a

On the Atlantic seaboard, forming part of the peninsula between the Chesapeake and Delaware Bays. It covers an area of 2129 square miles. The population in 1840, and at the end of every ten years down to 1870, has been as follows—:

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<th>Year</th>
<th>White</th>
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<td>1840</td>
<td>54,561</td>
<td>18,919</td>
<td>2605</td>
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<td>1850</td>
<td>71,169</td>
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<td>1860</td>
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It is a tradition that the Delaware River, for a trading-post. The

There are five judges in the State, viz., a chancellor, who is also president of the Orphans' Court (the associate judge residing in the county serving with him in the county where the court is held), a chief justice, and an associate judge from every one of the three counties. There is a State school fund, which is further increased by the proceeds of the marriage and liquor licences. Every hundred which, by either taxation or subscription, supports a free school is entitled to its share of the fund. The debt of the State is $1,324,000, and as the cost of the government is moderate, the taxes are small.

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Court of Chancery in England, and pending the trial the
"three lower counties" were not sure to whom they
belonged, and so paid no land rent. In 1768 the suit
was decided, and commissioners appointed, who defined
the boundary line of Maryland as it now stands. It was
in the year 1776 that the first constitution of the State of
Delaware was framed, whereby "the three lower counties
on the Delaware" lost their awkward name, and again
had a new form of government. In the same year
Delaware, as one of the thirteen colonies, signed the
Declaration of Independence; and in 1787 the State, in
convention, adopted the constitution of the United States.
In 1792 a new State constitution was enacted, and again
in 1831, which is now in force. Under it, the governor
is elected for four years, and the legislature meets biennially
at Dover, the State capital. Delaware was one of the
original thirteen States, and, though slave-holding, remained
loyal to the Union at the secession of the Southern States
in 1861.

DELAWARE, a city of the United States, capital of
a county of the same name in Ohio, is situated on the
west bank of the Olentangy, nearly in the centre of the
State, 24 miles north of Columbus. Its principal public
institutions are the Ohio Wesleyan university and a female
college belonging to the same body. The manufactures
consist of candle, currie, hempen cloth, and iron work. A
medieval spring in the neighbourhood is resorted to for
the benefit of its waters. Population (1870), 5641.

DEL CREDERE AGENT is one who, selling goods
for his principal on credit, undertakes for an additional
commission to guarantee the solvency of the purchaser.

DELFICO, Macrizzano (1744–1830), an eminent
Italian writer on political economy, was born at Teramo in
the Abruzzi on the 1st August 1744, and was educated at
Naples. He devoted himself specially to the study of
jurisprudence and political economy, and thus qualified
himself for the valuable service he was to render to his
native country by his writings on legal and economic
subjects. His first publication, 
Sagone filosofico nel
matrimonio (1768), an eloquent vindication of marriage
against the loose practices which were prevalent. To his
Memorie sul Tribunale utile Guerra e sulle Legge
Economiche nelle Province confinante del Regno, addressed
to the king, the Neapolitans owed the abolition of the
most vexatious and absurd restrictions on the sale and exporta-
tion of agricultural produce. Other Memorie on kindness
subjects followed, and did much to promote reform in the
direction of free trade. Equally beneficial was the adop-
tion of the principles developed in his Reflections sulla
Vendita dei Fendi Deduciti, in 1790, and his Lettera al
Duca di Calabria sulla Fendi Deduciti in 1795, which were
so powerfully reasoned that a law was promulgated
for the sale of all feudalities reverting to the crown as free
castes. During the short reign of Joseph Bonaparte at
Naples, Delifico was made a councillor of state, and
employed in the formation of the new judicial organization
of Naples. He was employed in a similar manner under
Murat; and, when Ferdinand was restored in 1815,
Delifico was made president of the commission of the
archives, an office which he filled until 1823, when he
refused his resignation on account of his advanced age.
His sovereign acknowledged his eminent patriotic service by
promising him a large pension for life. Soon after, he
retired to his native town, where he died on the 21st June
1833, at the advanced age of ninety-one. Besides the
works we have noticed, on which his Neapolitan fame may
be said chiefly to rest, we owe to him several general works
on: trade specially Ricerche sul Carattere della
Giusprudenza Romana, e di esse Culture, 1790, and
Pensieri sulla Storia, e sull' Incertezza ed Istiilità
della Modernità, 1806, which have both been several times
reprinted. In the latter he has anticipated the scepticism of Niebuhr on the early history of Rome, which he treats
as fabulous; and he demurs to the Romans before the second
Punic war all art but that of agriculture, and of making
war on their neighbours.

See Gregorio de Filippos Dellico's Della Vita e delle Opere di
Melchorre Dellico (Teramo, 1830), and Tapialio's Biografia
dell' Italiani illustri (vol. ii.)

DELT, a town of Holland, in the province of South
Holland, on the Schie, nearly ten miles from Rotterdam,
and in the line of the canal between that city and the
Hague. It is well and regularly built in the form of a
square, but has a rather gloomy appearance from its streets
being traversed by narrow stagnant canals. The public
buildings comprise the Prasenhof, or palace, where William
of Orange was assassinated in 1844, the town house,
ereeted in 1616, with antiquarian and artistic collections,
the Old Church, dating from the 11th century, and con-
taining monuments to Van Tromp and Piet Hein, and the
tomb of Leeuwardenhe, the naturalist., the New Church,
founded in 1281, and interesting both for its chime of 600
bells, and as the burial-place of the princes of the house of
Orange from the days of the Liberator down to the present
century, the arsenal, originally erected as a warehouse for
the East India Company, and the polytechnic school, with
the fine collection of mechanical models formerly preserved
in the dockyard at Amsterdam. It is sufficient to mention
the powder-magazine, the school of military engineering,
the theatre, the municipal school for the colonies, the school of
design, the lunatic asylum, and Madame Benewiand's orphanage.
For a long time the name of Delft was associated, not only in
Holland, but even abroad, with the manufacture of excellent
toilett, but this industry, as well as the beer-brewing
which was of great importance last century, has become
almost extinct. The present branches are carpet-weaving,
cooperage, dyework, and distilling. The town was founded
about 1075 by Duke Geoffrey of Lorraume after his con-
quered of Holland from Count Therry. It was almost
totally ravaged by fire in 1566, and in 1654 it lost about
1200 of its population by the explosion of a powder
magazine. In 1797 the Chrisla Sacrum Society was founded
by Onder van Vuygaard-Ceauus, the burgomaster of the
city, for the utopian purpose of uniting one community all
the various branches of the Christian church. Of the
celebrated town the town the most famous is Grotius, whose
tomb is shown in the New Church. Population
in 1874, 23,900.

DELHI, a district of British India under the jurisdic-
tion of the lieutenant-governor of the Punjab, situated
between 28° 17' and 28° 13' N., 76° 53' and 77°
34'E long. It consists of a strip of territory on the right
or west bank of the River Jumna, 75 miles in length, and
varying from 15 to 23 miles in breadth, bounded on the
N. by the district of Karnal, on the E. by the Jumna river
separating it from Meerut (Mides) and Bulandshahr dis-
tricts, on the S. by Rohtak, and on the W. by Gargson.
With the exception of a low-lying alluvial tract in the
north, and a narrow fringe of fertile soil along the river
bank to the south of Delhi city, the country consists of stony
or hard sandy soil, where cultivation mainly depends upon
artificial irrigation. This is supplied by the Western
Jumna canal, which has a course of 51 miles in the district,
by the Ah Murdcan canal, constructed by a celebrated
Persian nobleman of that name; by the new Agra canal;

* The name is also applied to a Division or Commandery,
comprising the districts of Delhi, Gargoon, and Karnal, containing
a total area of 5557 square miles, with a population of 1,929,912.
and by the Jumna river, and a few hill streams. An
offshoot of the Mewāri hills runs in a north-easterly direction
nearly across the district. This offshoot forms a sterile,
rocky table-land, from two to three miles in breadth, but
nowhere exceeding 500 feet above the level of the sur-
rounding country.

The district population, according to a census taken in
1865, numbered 698,885 souls, scattered over an area of
1227 square miles, showing a density per square mile of 496
persons. According to their religious beliefs the inhabi-
tants are thus classified:—Hindus, 438,886, or 72 08 per
cent; Mahometans, 130,645, or 2146 per cent; Sikhs,
580, or '09 per cent; others, 38,739, or '06 per cent.
Four towns contain a population exceeding 5000,—viz.,
Delhi city, population 154,417; Sonipat, 12,176; Farid-
bād, 7990; and Babargah, 6281.

The principal agricultural products of the district are
wheat, barley, sugar-cane, and cotton. In the lands of the
northern part, commanded by the irrigation canals, cotton
and sugar-cane are the most important staples of the autumn
harvest, while ḍārā (great millet), ḍāyā (spaked millet), and
maكاi (Indian corn) are grown for local consumption. The
spring crops consist of the better kinds of grain, such as
wheat and barley, and of gram and tobacco. In some
irrigated villages a superior kind of rice is grown, but it
nowhere forms a staple product. Cotton cultivation is
extending, and a ready market for the fibre exists in
Delhi city. The total area of the district is returned at
814,672 acres, of which 525,255 are cultivated, viz., 206,853
irrigated and 318,402 unirrigated. A tract of 1147 acres,
set apart by the native rulers as a hunting ground, is now
inclosed by Government as a timber preserve; and other
plantations along the banks of the river have recently been
formed and placed under the Forest Department. The
hills produce good building stone, and a fair kind of rasbīl
of two colours, black and grey. A white clay, supposed to
be kaolīn, is found at Arangpur, Murādpur, and Kasmpur,
and has been employed with success at the Government
foundry at Burki for making crucibles. At the first named
village is a crystal mine, no longer worked. The East
India Railway and the Punjab Railway run trains into
Delhi from their junction at Ghazābād, about twelve
miles distant, while the Rājputāna State Railway traverses
the district for about twelve miles in the direction of
Gurgoān. The Government revenue of Delhi district in
1872–73 amounted to £283,082,—of which £39,036 was
derived from the land, £294,909 from salt and custom
duties, and £14,086 from stamps. The land settlement
is not a permanent one, but for a term of years. For
the education of the people Government in 1872–73
maintained in the whole of the district 72 schools, attended
by 3846 pupils, at an outlay to the state of £7760. There
were also 32 unaided indigenous schools, attended by 529 pupils
in 1872–73. Three Government dispensaries gave gratui-
tous relief to 18,305 patients, at a cost of £2955, 8s.
(1872–73). For administrative purposes, the district is
subdivided into three taluks, or districts, viz., Delhi, Shah-
agar. The staff consists of a deputy commissioner, with
two assistants and two extra assistant commissioners, a
judge of the small cause court, 3 tahsīldārs and 3 naib or
assistant tahsīldāra, a superintendent and an assistant
superintendent of police, and a civil surgeon.

The early history of the district will be found noticed
below. In the last century, the Delhi empire fell under
the Marathās, and the emperor Shāh Alam be-
came a pensioner of the Mahārājā Sūndhīa. In 1803
Lord Lake broke the Maratha power. The Mughul
emperor was taken under the protection of the Company,
and a considerable tract of country, consisting of nearly all
the present districts of Delhi and Ḥissār, was assigned for
the maintenance of the royal family. This tract was
placed under charge of a British officer as Receiver,
and the revenue was collected and justice administered in
the name of the emperor. The annual allowance to the royal
family paid from this assigned territory was originally
£100,000; it was afterwards increased to £120,000, and
subsequently to £150,000, exclusive of certain crown lands
which yielded about £15,000 a year. The emperor
received the homage of royalty; and throughout the
assigned territory all judicial decrees were pronounced in
his name, and sentences of death were referred to him for
approval. The fiscal arrangements were under the entire
control of the resident. This continued till 1852, when the
office of resident was abolished, the tract being annexed
to the North-Western Provinces, and a British Commissioner
appointed to administer it. On the outbreak of the sepoy
mutiny in 1857, the whole of the district was for a time
lost to British rule, and the southern part was not subdued
until after the fall of Delhi city in September 1857. In
1868, the whole of the district was annexed to the North-Western
Provinces, and was administered by the Commissioner of
the then newly constituted lieutenant-governorship of the Punjab.

Delhi, the chief city of the district and division of the
same name, and the capital of the Mughul empire, is
situated in 28° 39′ 40″ N. lat., and 77° 17′ 45″ E. long. It
stands on the right bank of the River Jumna, and is inclosed
on three sides by a lofty wall of solid stone constructed by
the Emperor Shāh Jāhān, and subsequently strengthened
by the English at the beginning of the present century
by a ditch and glacis. The eastern side, where the city
extends to the river bank, has no wall; but the high
wall is faced with masonry, and bears from the outside
the appearance of one. The circuit of the wall is 54 miles.
It has ten gates, of which the principal are the Kashmir
and Mori gates on the north; the Cabul and Lahore gates on
the west; and the Ajmir and Delhi gates on the east.
The imperial palace, now known as the fort," is situated
in the east of the city, and abuts directly on the river. It
is surrounded on three sides by an imposing wall of red
granite, with small round towers, and a gateway on the west and
south. Since the mutiny of 1857 a great portion of
the palace has been demolished in order to make room
for English barracks. The more beautiful buildings in the
palace, viz., the entrance hall, the wālbā khānā or music
hall, the divān-i-dōr or hall of public audience, the divān-
i-khāns or hall of private audience, the ranj mahal, and
some pavilions, have been preserved intact. As Mr
Fergusson well says, in his History of Architecture, however,
these buildings " without the courts and corridors connect-
ing them lose all their meaning, and more than half their
beauty." South of the fort, in the Dariāganj quarter of the
city, is a cantonment for a regiment of native infantry,
which, with one wing of a European regiment stationed
within the fort, makes up the garrison usually stationed at
Delhi. On the opposite side of the river is the fortress of
Salimgarh, erected in the 16th century by Salim Shāh, and
now Delhi. At this point the East India Railway enters
the city by a magnificent bridge across the Jumna, passing
over Salimgarh, and through a corner of the fort, to the
railway station within the city walls. Thence the line
proceeds as the Rājputāna State Railway, and, after
traversing the city, emerges through the wall on the north-
west. In the north-eastern corner of the city, within the
walls, and close to the Kashmir gate, are situated the
treasury and other public offices. Dariāganj, the fort, the
public offices, and the railway form an almost continuous
line along the eastern and northern faces of the city,—the
angle between them being devoted to public gardens.
The area thus occupied amounts to nearly half of that of
the entire city; it presents a comparatively open appear-
The buildings in the native town are chiefly of brick, well-built and substantial. The smaller streets are narrow and tortuous, and in many cases end in cul-de-sac. On the other hand, no city in India has finer streets than the main thoroughfares of Delhi, ten in number, thoroughly drained, tarred, and lighted. The principal thoroughfare, the Chandni Chauk, or Street of Silver, leads eastwards from the fort to the Lahore gate, and is three-quarters of a mile long by 74 feet broad. Throughout the greater part of its length, a double row of nizam and plyed trees runs down its centre on both sides of a raised path, which has taken the place of the masonry aqueduct that in former days conducted water from the canal into the palace. A little to the south of the Chandni Chauk is the Jama Masjid, or great mosque, and standing out boldly from a small rocky rising ground. Begun by Shah Jahan in the fourth year of his reign, and completed in the tenth, it still remains one of the finest buildings of its kind in India. Its front court-yard, 450 feet square, and surrounded by a cloister open on both sides, is paved with granite unaided with marble, and commands a view of the whole city. The mosque itself, a splendid structure forming an oblong 261 feet in length, is approached by a magnificent flight of stone steps. Three domes of white marble rise from its roof, with two tall and graceful minarets at the corners in front. The interior of the mosque is paved throughout with white marble, and the walls and roof are lined with the same material. Two other mosques in Delhi deserve a passing notice,—the Kala Masjid, or black mosque, so called from the dark colour given to it by time, and supposed to have been built by one of the early Afghan sovereigns, and the mosque of Roohán-ud-daulah. Among the more modern buildings of Delhi may be mentioned the Government College, founded in 1792, the Residency, and the Protestant church, built at a cost £10,000, by Colonel Skinner, an officer well-known in the history of the East India Company. About half-way down the Chandni Chauk is a high clock-tower, with the institute and museum beneath. Behind lies the Chandni Chauk, to the north, the Queen's Garden, beyond them the "city lines" stretch away as far as the well-known rocky ridge, about a mile outside the town. From the summit of this ridge the view of the station and city is very picturesque. To the south-east adjoins a suitable suburb cluster beyond the walls, containing the tombs of the imperial family, that of Humayun, the second of the Mughal dynasty, is a noble building of granite inlaid with marble. It lies about two miles from the city, amid a large garden of terraces and fountains, the whole surrounded by an embattled wall, with towers and four gateways. In the centre stands a platform about 20 feet high by 200 feet square, supported by clousters, and ascended by four great flights of granite steps. Above rises the Mausoleum, also a square, with a great dome of white marble in the centre. About a mile to the westward is anotherbury-ground, or collection of tombs and small mosques, some of them very beautiful. The most remarkable is perhaps the little chapel in honour of a celebrated Mussulman saint, Nisam-ud-din, near whose shrine the members of the late imperial family, up to the time of the mutiny, lie buried, each in his own little inclosure, surrounded by very elegant lattice-work of white marble. The Kutub Minār, or Pillar, is situated about nine miles south of the city. The palaces of the nobles, which formerly gave an air of grandeur to the city, have for the most part disappeared. Their sites are occupied by structures of less pretension, but still of some elegance of architectural design. The city is now amply supplied with water, and much attention has of late been paid to its cleanliness and its sanitary condition generally. The principal local institution was, until 1877, the Delhi College, founded in 1792. It was at first exclusively an Oriental school, supported by the voluntary contributions of Mahometan gentlemen, and managed by a committee of the subscribers. In 1829 an English department was added to it, and in 1855 the institution was placed under the control of the Educational Department. In the mutiny of 1857 the old college was plundered of a very valuable Oriental library, and the building completely destroyed. A new college was founded in 1858 and was called the University of Calcutta in 1864. The old college attained to great celebrity as an educational institution, and produced many excellent scholars. Under orders of the Government of the Punjab (February 1877), the collegiate staff of teachers was to be withdrawn, in order to concentrate the grant available for higher-class education upon the central and most useful institution at Lahore, the present capital of the province.

The population of Delhi in 1853 was returned at 122,474, viz., 76,590 Hindus and 76,014 Mahometans. In 1863, the census showed that since the Mutiny the Mahometan population had greatly diminished, while on the other hand the Hindus had considerably increased. In that year, the population was ascertained to be made up as follows:—Hindus, 85,057 (males 46,541, females 38,516); Mahometans, 61,729 (males 32,561, and females 29,168). The smaller streets are narrow Delhi, it is believed to be one surviving relic. A list of monarchs brings the history of Indraprastha down to the middle of the 1st century B.C., when the seat of government was transferred to Mathura by the Emperor Aśoka. Under the Tomara people, who were the successors of the Tomara, the city passed into the hands of the Chohan king of Ajmir, but a marriage of the daughter of the vanquished monarch to the son of the conqueror united the two families. The son of this union, the famous
Prithivi Raja, was the last Hindu ruler of Delhi. In 1191 came the invasion of Muhammad of Ghor. Defeated on this occasion, Muhammad returned two years later, overthrew the Hindus, and captured and put to death Prithivi Raja. Delhi became henceforth the capital of the Mahometan Indian empire, Kutub-ud-din (the general and slave of Muhammad of Ghor) being left in command. His dynasty is known as that of the slave kings, and it is to them that old Delhi owes its grandest remains, among them Kutub-ud-din's mosque and pillar, a few miles south of the modern city. The slave dynasty retained the throne till 1288, when it was subverted by Jalal-ud-din Ghilzai. The most remarkable monarch of this dynasty was Ala-ud-din, during whose reign Delhi was twice exposed to attack from invading hordes of Mughals. On the first occasion, Ala-ud-din defeated them under the walls of his capital; on the second, after encamping for two months in the neighbourhood of the city, they retired without a battle. The house of Ghilzai came to an end in 1321, and was followed by that of Taghlak, in whose time the Pathan kings had been content with the ancient Hindu capital, altered and adorned to suit their tastes. But one of the first acts of the founder of the new dynasty, Ghias-ud-din Taghlak, was to erect a new capital about four miles further to the east, which he called Taghliakkabud. The ruins of his fort remain, and the eye can still trace the streets and lanes of the long deserted city. Ghias-ud-din was succeeded by his son Muhammad Taghlak, who reigned from 1325 to 1351, and is described by Elphinstone as "one of the most accomplished princes and most furious tyrants that ever adorned or disgraced human nature." Under this monarch the Delhi of the Taghlak dynasty attained its utmost growth. His successor Firuz Shah Taghlak transferred the capital to a new town which he founded some miles off, on the north of the Kutub, and to which he gave his own name, Firozabad. In 1398, during the reign of Mahmud Taghlak, occurred the Tartar invasion of Timurlane. The king fled to Guzerat, his army was defeated under the walls of Delhi, and the city surrendered. The town, notwithstanding a promise of protection, was plundered and burned; the citizens were massacred. The invaders at last retired, leaving Delhi without a Government and almost without inhabitants. At length Mahmud Taghlak regained a fragment of his former kingdom, but on his death in 1412 the family became extinct. He was succeeded by the Sayyid dynasty, which held Delhi and a few miles of surrounding territory till 1444, when it gave way to the house of Lodi, during whose rule the capital was removed to Agra. In 1486 Baber, sixth in descent from Tamerlane, invaded India, defeated and killed Ibrahim Lodi at the battle of Panipat, entered Delhi, was proclaimed emperor, and finally put an end to the Afghan empire. Baber's capital was at Agra, but his son and successor, Humayun, removed it to Delhi. In 1540 Humayun was defeated and expelled by Sher Shah, who entirely rebuilt the city, inclining and fortifying it with a new wall. In this time Delhi was extended from where Humayun's tomb now is to near the southern gate of the modern city. In 1556 Humayun, with the assistance of Persia, regained the throne; but his death within six months afterwards, and was succeeded by his son, the illustrious Akbar.

During Akbar's reign and that of his son Jahangir, the capital was either at Agra or at Lahore, and Delhi once more fell into decay. Between 1638 and 1658, however, Shah Jahan rebuilt it almost in its present form; and his city remains substantially the Delhi of the present time. The imperial palace, the Jama Masjid, and the restoration of what is now the western Jumna canal, are the work of Shah Jahan. The Mughul empire rapidly expanded during the reigns of Akbar and his successors down to Aurungzeb, when it attained its climax. After the death of the latter monarch, in 1707, came the decline. Insurrections and civil wars on the part of the Hindu tributary chiefs, Sikhs and Marattas, broke out. Aurungzeb's successors became the helpless instruments of conflicting chieftains. His grandson, Jahandar Shah was, in 1713, deposed and strangled after a reign of one year; and Farrukhays, the next in succession, met with the same fate in 1719. He was succeeded by Muhammad Shah, in whose reign the Marattas forces first made their appearance before the gates of Delhi, in 1736. Three years later the Persian monarch, Nadir Shah, after defeating the Mughul army at Karnal, entered Delhi in triumph. While engaged in levying a heavy contribution, the Persian troops were attacked by the populace, and many of them were killed. Nadir Shah, after vainly attempting to stay the tumult, at last gave orders for a general massacre of the inhabitants. For fifty-eight days Nadir Shah remained in Delhi, and when he left he carried with him a treasure money amounting, at the lowest computation, to eight or nine millions sterling, besides jewels of inestimable value, and other property to the amount of several millions more.

From this time (1740) the decline of the empire proceeded unchecked and with increased rapidity. In 1771 Shah Alam, the son of Alamgir II., was nominally raised to the throne by the Marattas, the real sovereignty resting with the Marattah chief, Sindia. An attempt of the puppet emperor to shake himself clear of the Marattas, in which he was defeated in 1788, led to a permanent Marattah garrison being stationed at Delhi. From this date, the king remained a cipher in the hands of Sindia, who treated him with studied neglect, until the 8th September 1803, when Lord Lake overthrew the Marattas under the walls of Delhi, entered the city, and took the king under the protection of the British. Delhi, once more attacked by a Marattah army under the Marattah chief Holkar in 1804, was gallantly defended by Colonel Ochterlony, the British resident, who held out against overwhelming odds for eight days, until relieved by Lord Lake. From this date a new era in the history of Delhi began. A pension of £30,000 per annum was allowed to the king, with exclusive jurisdiction over the palace, and the titular sovereignty restored with the Marattah chief, Sindia. Fifty-three years of quiet prosperity for Delhi were brought to a close by the mutiny of 1857. Its capture by the mutineers, its siege, and its subsequent recapture by the British have been often told, and nothing beyond a short notice is called for here. The outbreak at Meerut occurred on the night of the 10th May 1857. Immediately after the murder of their officers, the rebel soldiery set out for Delhi about 35 miles distant, and on the following morning entered the city, where they were joined by the city mob. Mr Fraser, the commissioner, Mr Hutchinson, the collector, Captain Douglas, the commandant of the palace guards, and the Rev. Mr Jennings, the residency chaplain, were murdered, as were also most of the civil and non-official residents whose houses were situated within the city walls. The British troops in cantonments consisted of three regiments of native infantry and a battery of artillery. These cost in their lot with the mutineers, and commenced by killing their officers. The Delhi magazine, then the largest in the north-west of India, was in the charge of Lieutenant Willoughby, with whom were two other officers and six non-commissioned officers. The magazine was attacked by the mutineers, but the little band defended to the last the continuous accumulation of great damage, and, when further defence was hopeless, fired the magazine. Five of the nine were killed by the explosion, and...
The occupation of Delhi by the Shah, was curt·yard.

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DiEiL, a festival of Apollo held in Delos. It included athletic and musical contests, for which the prize was a branch of the sacred palm. This festival was said to have

been established by Theseus when returning from Crete.
The Athenians took special interest in maintaining its

splendor

DELILE, Jacques (1738–1813), a French poet, was born on the 22d of June 1738, at Augue-Perse in Auvergne. He was an illegitimate child, and was connected by his mother with the family of the Chancellar of l'Hôpital. With very slender means of support he was educated at the college of Luxeaux in Paris, and made such progress in his studies as augured well for his future distnction. When his education was completed, he was forced to accept of a very humble situation as elementary teacher in the college of Beaunes, but this was soon exchanged for the more honourable station of professor of

the city, and he had no siege
tran or heavy guns. All that could be done was to hold

the position till the arrival of reinforcements and of a

siege train. During the next three months the little

British force on the ridge were rather the besieged than the

besiegers. Almost daily sallies, which often turned

into pitched battles, were made by the rebels upon the

over-worked handful of Europeans, Sikhs, and Gurkhas. A great struggle took place on the centenary of the battle of

Plossey, June 23, and another on the 25th August, but on

both occasions the mutineers were repulsed with heavy loss

General Barnard died of cholera in July, and was succeeded by General Archdale Wilson. Meanwhile reinforcements and siege artillery gradually arrived, and easily in September it was resolved to make the assault. The first of the heavy batteries opened fire on the 8th September, and on the 12th a practicable breach was reported. On the morning of the 14th the assault was delivered, the points of attack being the Kashmir bastion, the water bastion, the Kashmir gate, and the Lahore gate. The assault was thoroughly successful, although the column which was to enter the city by the Labore gate sustained a temporary check. The whole eastern part of the city was retaken, but at a loss of 66 officers and 1100 men killed or wounded, but or the total strength of 9866 Fighting continued more or less during the next six days, and it was not till the 20th September that the entire city and palace were occupied, and the reconquest of Delhi was complete. During the siege, the British force sustained a loss of 1012 officers and men killed, and 3857 wounded. Among the killed was General John Nicholson, the leader of one of the storming parties, who was shot through the body in the act of leading his men, in the first day’s fighting. He lived, however, to learn that the whole city had been recaptured, and died on the 25th September. On the flight of the royal family the house and several members of the royal family took refuge at H dumay’s tomb. On receiving a promise that his life would be spared, the last of the house of Timur surrendered to Major Hodson, he was afterwards banished to Rangoon. Delhi, thus recon­quered, remained for some months under military author­ity. Owing to the murder of several European soldiers who strayed from the lines, the native population was expelled the city. Hindus were soon afterwards re-admitted, but for some time Mahometans were rigorously excluded. Delhi was made over to the civil authorities in January 1858, but it was not till 1861 that

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s. But the romance of antiquity still lingers around it, and Delhi was selected for the scene of the Imperial

Proclamation on the 1st January 1877.

An excellent chapter on Delhi will be found in Mr. Keene’s Fall of the Moghul Empire. In preparing the above account, the materials have been chiefly drawn from the official Statistical Account of Delhi District, together with W J Kaye’s History of the Seige War

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NATURE. His next place of refuge was in Germany, where he composed his *La Pitié*; and finally, he passed two years in London, chiefly employed in translating Paradise Lost. In 1801, finding that he might return safely to Paris, he did so, carrying with him his immense Poetical Encyclopaedia. He resumed his professorship and his chair at the Academy, but lived in retirement. His later poems were very numerous, but were not fitted to increase his reputation, which rests mainly on his translation of the *Georgics* and his *Jardins*. In his later years he became blind. He died on the 1st May 1813.


**DELIRIUM.** A temporary disorder of the mind generally occurring in connection with some form of bodily disease. It may vary in intensity from slight and occasional wandering of the mind and incoherence of expression, to fixed delusions and violent maniacal excitement, and again it may be associated with more or less of coma or insensibility (see MENTAL AFFECTIONS). Delirium is apt to occur in most diseases of an acute nature, such as fevers or inflammatory affections, in injuries affecting the brain, in blood diseases, in conditions of exhaustion, and as the result of the action of certain specific poisons, such as opium, Indian hemp, belladonna, chloroform, and alcohol. The form of delirium varies according to the action of the last-mentioned substance and one of great importance from its comparative frequency and is well known by the name of Delirium Tremens.

Delirium Tremens is one of a train of symptoms of what is termed in medical nomenclature acute alcoholism, or recent excessive indulgence in alcohol. It must, however, be observed that this disorder, although arising in this manner, rarely consists of the result of the occurrence of a single debauch in a person unaccustomed to the abuse of stimulants, but generally occurs in cases where the nervous system has been already subjected for a length of time to the poisonous action of alcohol, so that the complaint might be more properly regarded as acute supervening on chronic alcoholism. It is equally to be borne in mind that many habitual drunkards never suffer from delirium tremens.

It was long supposed, and is indeed still believed by some, that delirium tremens only comes on when the supply of alcohol has been suddenly cut off; but this view is now generally rejected, and there is abundant evidence to show that the attack comes on while the patient is still continuing to drink. Even in those cases where several days have elapsed between the cessation from drinking and the seizure, it will be found that in the interval the premonitory symptoms of delirium tremens have shown themselves, one of which is a desire to drink as well as food—the attack being in most instances preceded by marked derangement of the digestive functions. Occasionally the attack is precipitated in persons predisposed to it by the occurrence of some acute disease, such as pneumonia, by accidents, such as burns, also by severe mental strain, and by the deprivation of food, even where the supply of alcohol is less than would have been likely to produce it only by the continuous supply of the poison which was the original source of the disease inflicted serious damage upon the

by fits of an epileptiform character. Males are much more frequently the subjects of delirium tremens than females.

One of the earliest indications of the approaching attack of delirium tremens is sleeplessness, any rest the patient may obtain being troubled by unpleasant or terrifying dreams. During the day there is observed a certain restlessness and irritability of manner, with trembling of the hands and a thick or tremulous articulation. The skin is perspiring, the countenance oppressed-looking and flushed, the pulse rapid and feeble, and there is evidence of considerable bodily prostration. These symptoms increase each day and night for a few days, and then the characteristic delirium is superadded. The patient is in a state of mental confusion, talks incessantly and incoherently, has a distressed and agitated or perplexed appearance, and a vague notion that he is pursued by some one seeking to injure him. His delusions are usually of transient character, but he is constantly troubled with visual hallucinations in the form of disagreeable animals or insects which he imagines he sees all about him. He looks suspiciously around him, turns over his pillows, and ransacks his bed-clothes for some fancied object he supposes to be concealed there. There is constant restlessness, a common form of delusion being that he is not in his own house, but imprisoned in some apartment from which he is anxious to escape to return home. In these circumstances he is ever wishing to get out of bed and out of doors, and, although in general he may be persuaded to return to bed, he is soon desiring to get up again. The trembling of the muscles from which the name of the disease is derived is a prominent but not irremovable symptom. It is most marked in the muscles of the hands and arms and in the tongue. The character of the delirium is seldom wild or noisy, but is much more commonly a combination of busy restlessness and indefinite fear. When spoken to the patient can answer correctly enough, but immediately thereafter relapses into his former condition of incoherence. Occasionally maniacal symptoms develop themselves, the patient becoming dangerously violent, and the case thus assuming a much graver aspect than one of simple delirium tremens.

In most cases the symptoms undergo abatement in from three to six days, the character of the attack being marked by the occurrence of sound sleep, from which the patient awakes in his right mind, although in a state of great physical prostration, and in great measure if not entirely oblivious of his condition during his illness.

Although generally the termination of an attack of delirium tremens is in recovery, it occasionally proves fatal by the suppression of coma and convulsions, or acute mania, or by exhaustion, more especially when any acute bodily disease is associated with the attack. In certain instances delirium tremens is but the beginning of serious and permanent impairment of intellect, as is not frequently observed in confirmed drunkards who have suffered from frequent attacks of this disease.

The treatment of delirium tremens has given rise to much discussion among medical men, and the result has been that more rational views now prevail on the subject than formerly. This change is doubtless in great measure to be ascribed to the clearer ideas respecting the real nature and true cause of the malady which extensive and accurate observation has afforded. The theory once so widely accepted, that delirium tremens was the result of the sudden breaking off from indulgence in alcohol, led to its treatment by regular and often large doses of stimulants, a practice fraught with mischievous results, since, however useful it may have been in stimulating the delirium, it has been found for the true treatment of the continuous supply of the poison which was the original source of the disease inflicted serious damage upon the
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and as a commercial centre by the flourishing port of Syra. Besides the site of the chief settlement or city, the following are the spots of antiquarian interest which can still be identified:—the temple of Apollo, a splendid building of the Doric order which, in the words of Mr. Toter, now forms "a confused heap of white marble fragments, columns, bases, and entablatures, lying indiscriminately together," the portico erected by Philip of Macedon; the base (within the temple area) of the colossal statue dedicated to the Delian Apollo by the people of Naxos; a theatre of Parian marble on the slope of Mount Cythereus; a temple to Isis, further up the hill, which probably explains the myth of the connection between the brook Inocus and the Nile; the so-called "treasury" of Delos; an Ionic temple on the summit; and the circular tank or lake which supplied the water for the religious rites. The ordinary buildings on the island were constructed of native granite, but marble was imported for the nobler edifices, which were destined to serve as so many quarries to the mainland builders of Corinthian and Attic temples.


**DE LOUTHBOURG, DIDEROT JAMES (1740-1813),** an artist of remarkably versatile ability and interesting personality. He was born at Strasbourg, 31st October 1740, where his father, the representative of a noble Polish family, practised miniature painting in a semi-amateur manner; but he spent the greater part of his life in London, where he was naturalized, and exerted a considerable influence on the scenery of the English stage, as well as on the artists of the following generation, Turner, Martin, &c.

Young De Louthbourg was intended for the Lutheran ministry, and was educated at the university of Strasbourg. As the calling, however, was foreign to his nature, he insisted on being a painter, and placed himself under Vanloo in Paris. The result was the immediate and precocious development of extraordinary powers. Besides this triumph, and independently of it, he became a figure in the fashionable society of that day, and the friend of such men as Diderot, who had just then mainly contributed to make Gesner celebrated. He was elected into the French Academy below the age required by the law of the institution, and painted landscapes, seascapes, bays, all of which had a celebrity above those of the specialists than working in Paris. By temperament whatever was extraordinary and sensational was attractive to him, and the bizarre appeared in all he did. His début was made by the exhibition of twelve pictures, including Storm at Sunset, Night, Morning after Rain; and when he painted common things, as a group of asses, he gave the picture such a fantastic title as—Father and Mother, Zallier, Paris, 1765, and exhibited it at the Académie Royale. Mesmer had attracted De Louthbourg, or that the Revolution carried him away, nor do we find an exact record of his connection with Cagliostro; but there exists a pamphlet published in 1789, *A List of a few Cures performed by Mr. and Mrs. De Louthbourg with Medicine*, which relates some very remarkable examples of such cures. Cagliostro had led him to seek the philosopher's stone, but his success was frustrated by a female relative breaking into on his nocturnal experiments and destroying the crucible at the very moment of projection. He died 11th March 1812. His publications are few,—some sets of etchings, and *English Scenery*, 1805. His colour is hot and brown, which has injured his fame as a painter.

**DELPHI, Δήλφι, a town of ancient Greece in the territory of Phocis, famous as the seat of the important temple and oracle of Apollo. It was situated about six miles inland from the shores of the Corinthian Gulf, in a rugged and romantic glen, closed on the N. by the steep wall-like under-cliffs of Mount Parnassus known as the Phedriades, or Shining Rocks, on the E. and W. by two minor ridges or spurs, and on the S. by the irregular heights of Mount Cirillus. Between the two mountains the Pleutes flowed from east to west, and opposite the town received the brooklet of the Castalian fountain, which, in a deep gorge like under-cliffs of Mount Parnassus known as the Phedriades, or Shining Rocks, on the E. and W. by two minor ridges or spurs, and on the S. by the irregular heights of Mount Cirillus. The site of the ancient town is now occupied by the village of Castri, and the natural features of the scene have been somewhat altered by the earthquake of 1870; but the main points of interest can still be distinguished.

The principal building of Delphi was the temple of Apollo, which stood immediately under the shelter of the northern cliff. It appears to have been of the Doric order outside, and of the Ionic within. The front was built of Parian marble, and the sculptural decorations were extremely rich. One pediment was adorned with representations of Latona, Diana, Apollo, and the Sibyls; the other with Parnassus and the Thyiades; the eastern architrave was hung with gilded shields presented...
by the Athenians from the spoils of Marathon, and the western with similar trophies taken by the Athenians from the Gauls, while among the subjects of the metopes are mentioned Hercules slaying the Lernean Hydra, Bellerophon and the Chimæra, Zeus and Minas, Pallas and Eriaphantos, and Dionysus and a Giant. In the pronaoes were inscribed the maxims of the Seven Sages of Greece, in the eidos the sacred fourth with a poros bote and the 
epaphos, or nave-stone, which was supposed to mark the centre of the world; and in the adytum was the sacred tripod and the subterranean chamber from which the vapour of prophecy ascended. Of less important buildings may be mentioned the Zeuxis, or public hall, the walls of which were adorned with the works of Polygnotus and other master-pieces of ancient art, the theatre, where the musical contests connected with the Pythian games were held, the Stadium, of which there are still considerable remains; and, in the suburb of the same name, the Pythians, or assembly hall of the Amphitheatric Council. The town was entered from the east by a road from Boetia known as the Schiste, or Cloven Way, and from the west by the great Corinthian road, which was used by the pilgrims who came from the Corinthian Gulf, and by another which stretched north-west to Amphissa. These roads were regarded almost as the property of the temple, and shared in its sacredness, and each Amphitheatric stone was bound to keep them in repair within its own boundaries. About seven miles to the north of the town, on the side of Mount Parnassus, was the famous Corycan cave, a large grotto in the limestone rock, which afforded the people of Delphi a refuge during the Persian invasion. It is now called in the district the Samnius Aulus, or Forty Cours, and is said to be capable of holding 500 people.

Of the origin of the Delphian oracle nothing is known. One legend tells how the prophecies were discovered by a shepherd whose goats began to shirk about under the influence of the subterranean vapour, and another related how Apollo, after he had slain the great serpent Python on the spot, boarded a Cretan ship in the neighbouring gulf, and consecrated the crew to his service. It seems almost certain that the place was the seat of a religious establishment previous to its connection with the temple of Apollo; but its whole historic importance—which can hardly be over-estimated—is entirely due to this connection. The first temple of stone was reputed to have been built by the semi-mythical personages Trophonius and Agamedes. It was burned down in 483 B.C., but was soon after replaced by the building which has already been described. The contract for the work was taken by the Athenian family of the Alcmæidae, who were at that time exiles from the tyranny of Hippas. They employed the architect Sopistratus, and acquired great credit for the disinterested liberality with which they accomplished their task. The principal facts in the history of Delphi have already been narrated in the article Amphictonies (vol. i. p. 772), where the reader will also find an account of the relations in which the temple stood to the states of Greece. It only remains to tell how the sanctuary and its treasures, which had been miraculously saved from the Persians and the Gauls, were put under contribution by Sulla for the payment of his soldiers; how Nero removed no fewer than 500 bronze images from the sacred precincts; and how Constantine the Great enriched his new city by the sacred tripods, the statues of the Hellenic Muses, the Apollo, and the celebrated Pan dedicated by the Greek cities after the conclusion of the war with the Melemis Julian afterwards sent Orontas to restore the temple, but the pope responded to the emperor's enthusiasm with nothing but a word over the glory that had departed.

See Calle an a a detailed description of the town in the second century of the Christian era, the see of Eusebius for many interesting descriptions, and among modern works Winter, De religioni et scilicet Apollo Delphiensi, Copenhagen, 1827; Helleman, Wunderkunde des Delphischen Orakels, 1837; and Delphi Orakel, 1839, Curwan, Anecdota Delphica, 1843, Schleiermacher in Allgemeinen Zeitung, 1874.

DELPHIA, a festival of Apollo held annually on the 7th of the month Munychion (April) at Athens, where he was styled Delphinos. All that is known of the ceremonies is that a number of girls proceeded to his temple carrying suppliants' branches and seeking to propitiate Apollo, probably as a god having influence on the sea. It was at this time of year that navigation opened again after the storms of winter.

DELTA. See Physical Geography.

DELUC, Jean André (1727-1817), geologist and meteorologist, born at Geneva, February 9, 1727, was descended from a family which had emigrated from Lucca and settled at Geneva in the 15th century. His father, Francois Deluc, was the author of some publications in refutation of Mandeville and other rationalistic writers, which are best known through Rousseau's humorous account of his enemies in reading them, and he gave his son an excellent education, chiefly in mathematics and natural science. On completing he engaged in commerce, which principally occupied the first forty-six years of his life, without any other interruption than that which was occasioned by some journeys of business into the neighbouring countries, and a few scientific excursions among the Alps. During these, however, he collected by degrees, in conjunction with his brother Guillaume Antoine, a splendid museum of mineralogy and of natural history in general, which was afterwards increased by his nephew Andre Deluc. He at the same time took a prominent part in politics. In 1768 he was sent to Paris on an embassy to the Duc de Choiseul, whose friendship he succeeded in gaining. In 1770 he was nominated one of the Council of Two Hundred. Three years later unexpected reverses in business made it advisable for him to quit his native town, which he only revisited once for a few days. The change was welcome in so far as it set him entirely free for scientific pursuits, and it was with little regret that he removed to England in 1773. He was made a fellow of the Royal Society in the same year, and received the appointment of reader to Queen Charlotte, which he continued to hold for forty-four years, and which afforded him both leisure and a competent income. In the latter part of his life he obtained several travels through Switzerland, France, Holland, and Germany. In Germany he passed the six years from 1798 to 1804, and after his return he undertook a geological tour through England. When he was at Gottingen, in the beginning of his German tour, he received the compliment of being appointed honorary professor of geology in that university, but he never entered upon the active duties of a professorship. He was also a correspondent of the Academy of Sciences at Paris, and a member of several other scientific associations.

His favorite studies were geology and meteorology. The situation of his native country had naturally led him to contemplate the peculiarities of the earth's structure, and the properties of the atmosphere, as particularly displayed in mountainous countries, and as subservient to the measurement of heights. He inherited from his father a sincere veneration for the doctrines of Christianity, and a disposition to defend the Mosaic account of the creation against the criticism whose principal weapons were furnished by his favourable science. His royal patron was most anxious to encourage and promote his labours in this field; and he was generally supposed to have had
great success in removing the objections which had been advanced by his antagonists against the comparatively recent formation of the present continents. According to Cuvier, he ranked among the first geologists of his age. His principal geological work, *Lettres physiques et morales sur l'Histoire de la terre* (5 vols. 8vo, The Hague, 1778), was dedicated to Queen Charlotte. It dealt with the appearance of mountains and the antiquity of the human race, explained the six days of the Mosaic creation as so many epochs preceding the actual state of the globe, and attributes the deluge to the filling up of cavities supposed to have been left void in the interior of the earth. This attempt to reconcile religion and science, so often since repeated, was ingenious and for a time successful with most minds. The theory of the Mosaic days was maintained in one form or other by several later geologists of high repute, though it is scarcely now thought worth discussion by any to whom that title can justly be applied.

Deluc's original experiments relating to meteorology are more valuable to the natural philosopher than most of his geological work; and he discovered many facts of considerable importance relating to heat and moisture. He noticed the disappearance of heat in the thawing of ice about the same time that Black founded on his ingenious hypothesis of latent heat. He ascertained that water was more dense about 40° Fahr. than at the temperature of freezing, expanding equally on each side of the maximum, and he was the originator of the theory afterward re-advanced by Dalton, that the quantity of aqueous vapour contained in any space is independent of the presence or density of the air, or of any other elastic fluid, through it appears difficult to reconcile this opinion with some of the experiments of Deluc's great rival, Saussure, a philosopher who, as he very candidly allows, made in many respects experiments on his own hygrometer and on Saussure's show only that both are imperfect; but it may be inferred from them that a mean between the two would in general approach much nearer to the natural scale than either taken separately. It appears also probable that Saussure's is rather less injured by time than Deluc's, which has been found to indicate an increasing amount of mean moisture in the year.

Deluc was a man of warm feelings, and of gentle and obliging manners, and his literary and scientific merits, as well as his unremitting attention to the service of the queen, insured her respect and kindness. He saw her daily for many years, and in his last illness, which was long and painful, she showed him repeated marks of benevolent regard. He died at Windsor on the 7th of November 1817.

A brief notice of his more important works, in addition to that mentioned above, will give a clear idea of the nature and range of his scientific activity. *Histoires physiques et morales de l'Atmosphère* (2 vols. 8vo, Geneva, 1773; 4 vols. 8vo, Par. 1784), contains many accurate and ingenious experiments upon moisture, evaporation, and the indications of hygrometers and thermometers, applied to the barometer employed in determining heights in the *Phil. Trans.,* 1773, appeared his account of a new hygrometer, which resembled a mercuial thermometer, with an ivory bulb, which was covered by a covering and caused the mercury to descend. The first correct rules ever published for measuring heights by the barometer were those he gave in the *Phil. Trans.,* 1771, p. 158. His *Lettres sur l'Histoire physique de la Terre* (9vo, Par. 1798) were addressed to Professor Blumenbach. The substance had already appeared in the *Journal de Physique,* for 1790, 1791, and 1792, in the volume containing an essay written for a prize by an unknown Berliner in 1791, but without success, on the existence of a General Præsumption of Morality. It also gives an interesting account of some conversations of the author with Voltaire and Diderot. Deluc was an ardent admirer of Bacon, on whose writings he published two works,—*Bacon et quid est* (8vo, Berlin, 1800), showing the bad faith of the French translator, who had omitted many passages favorable to revealed religion, and *Précis de la Philosophie de Bacon* (3 vols. 8vo, Paris, 1802), giving an interesting view of the progress of natural science. *Lettres sur la Force magnetique* (Berlin and Hanover, 1801 and 1802), is a kind of universal correspondence with Dr Teller of Berlin in regard to the mosaic cosmogony. His *Traité élémentaire de Géolog e* (8vo, Paris, 1803), also in English, by Delacour, the same year, was professedly intended as a refutation of the Vulcanian system of Hutton and Playfair, who deduced the changes of the earth's structure from the operation of fire, and attributed a higher antiquity to the present state of the continents than is required in the Neptunian system adopted by Deluc after Dohoues. He sent to the Royal Society, in 1809, a long paper on separating the chemical from the electrical effect of the piles, with a description of the electric column and aerial electroscope, in which he advanced opinions so little in unison with the latest discoveries of the day, that the council deemed it inexpedient to admit them into the Transactions. He had, indeed, on other occasions shown somewhat too much scepticism in the rejection of new facts; and he had never been convinced even of Cavendish's all-important discovery of the composition of water. The paper was afterwards published in *Nicolson's Journal* (1817), and the dry column described in it was constructed by various experimental philosophers. Many other of his papers on subjects hitherto to those already mentioned were to be found in the *Transact. Phil. Soc.* and in the *Philosophical Magazine.* See *Philosophical Magazine,* November 1817.

**DELUQUE, a subversion of the world, related by various nations as having taken place in a primitive age, and in which all, or nearly all, living beings are said to have perished.** This definition excludes all partial floods, and also the theory which would account for deluge-stories as exaggerations of traditions of local inundations. Upon a low level of culture, as Von Hahn has shewn, the memory of the most striking events is hardly preserved even for a few generations. It is best therefore to regard the story of the deluge as a subversion of the primitive man's cosmogony. The problem with which he had to deal was a complicated one,—given the eternity of matter to account for the origin of the world. The best solution which presented itself (and that only to the alchemists) was to represent creation as having taken place repeatedly, and the world as having passed through a series of demolitions and reconstructions. (See *Cosmogony.*). This explains the confusion between the creation and the deluge noticed by various travellers, e.g., among the Iroquois and the Santals—a confusion, however, which is only apparent, for the deluge is, when thoroughly realized, practically a second creation. Thus Manui the hero of the Indian flood-story, was, by permission of Brahma, the creator of the present human race. Noah is called by Arabic writers "the second Adam," and Maui might with as good a right be called the Noah as the Adam of New Zealand. We, in the adult age of the world, have renounced those mythical forms of expression, but we still retain much of the feeling which prompted them. The wonder of creation is even to us constantly renewed in spring; to primitive man it was renewed in a special sense in each of the great world-cycles of mythology. We may lay it down, then, as a canon at the outset, that the various deluge-stories must be viewed in combination, and explained on a common principle. At the same time we must be careful not to confound different "deposits" of tradition, and must regard primarily the earliest and most original forms of myths. As in the case of the cosmogonies, a few typical specimens will be all that can here be described.

I. Among the Siatuc races the seniority belongs to the *Babylonians.* Till lately, the only version of their story known to us was that of Berosus (Muller, *Fragmenta,* ii. 501), who relates that the god Kronos appeared to Xisuthrus, tenth king of Babylon [cf. Noah, tenth patriarch] in a dream, and warned him of the coming deluge. The details remind us a good deal of the biblical narrative, except that Xisuthrus is also accompanied by a steersman and by his near friend. Even the thrice repeated letting-out
DELUGE

of the birds is mentioned. At last the ship (as it is called) grounded "on a certain mountain," where Xusathros erected an altar and sacrificed; after which both he and his companions disappeared (cf. the "translation" of Enoch). The duration of the deluge is not stated, and its cause is left to be inferred from the special commendation of Xusathros for his pietv. Berossus has evidently drawn from cuneiform sources, but those sources have not yet been discovered. Our most valuable authority for the Babylonian deluge-story is the portion of the 11th lay of the great mythological epic, discovered by Mr. George Smith. It came from the library of King Assurbanipal, and dates from about 650 B.C., but the Accadian original from which it was translated may well (says the cautious Assyriologist, Dr. Schneider) have been composed between 1000 and 2600 B.C., while the myths themselves will of course be much older. The hero of the deluge bears the name of Tam-zi ("the sun of life," cf. Tammuz), for, so with Mr. Sayce, the signs should most probably be read. He is called the son of Ubair-tutu, an Accadian name meaning "the splendor of the sun" (Lenormant, Sayce). This version of the story differs in several respects from that of Berossus. The deity who warns Tamzi is Hea (god of knowledge and of the waters), who orders him to build a ship, and to put into it his household and his wealth and the beasts of the field. All this is related by Tamzi to the (solar) hero "Izidub" (cf. Gen. vi. 14). He tells how he coated the ship within and without with bitumen (cf. Gen. vi. 14), how he entrusted all to a "savior," how Samas, the sun-god, and other gods (Hea is not now mentioned) sent rain, and how the rain-flood "destroyed all life from the face of the earth." (Why the deluge was sent is a little uncertain, owing to the mutilated condition of the tablets.) On the seventh day there was a calm, and the ship stranded on the mountain Ninur. Another seven days, and Tamzi let out "a dove" (I), then a swallow, both of which returned, and a raven which did not return. Then he left the ship and made a libation; Mr. Smith's "altar" is uncertain. Finally, Hea intercedes with Bel that there be no second deluge, after which "Tamzi and his wife, and the people, were carried away to be like the gods." Such are the leading authentic features of the Babylonian narrative, or rather narratives, for its inconsistencies and repetitions are such as to force upon us the hypothesis that two documents originally existed, which have been welded together by an editor.

II. The Jewish narrative, like the Babylonian, has been thought to consist of two documents, an Elohist and a Yahvistic, which have been connected by an editor. They appear to differ in various details,-e.g., in the description of the introduction of the animals into the ark (the Elohist alludes to the legal distinction between clean and unclean), but they have certain the same origin, for they entirely coincide in the main outlines (e.g., in ascribing the flood to the depravity of mankind, in the mode of Noah's rescue, and in the promise that the catastrophe should not recur), and even in not a few expressions, among which are the names for the flood and the ark. They agree, further, in this important point, that some expressions point to a universal deluge, others to one which only affected a level inland region like that of Mesopotamia. We naturally ask, therefore, are the former involuntary exaggerations? or "survivals" of a primal myth? Both views are held by respectable critics; but the latter is more favoured by analogy and by the remarkable parallelism between both the biblical narratives (especially the Yahvistic) and the Babylonian.

These two—the Babylonian and the Jewish—are the only fully developed deluge-stories told by any of the Semitic nations. In what relation, then, do they stand to each other? Was the Babylonian borrowed from the Jewi(s or from some earlier form of the story, of which the Jewish is a modification, or vice versa? On the one hand, the Babylonian story as a whole perhaps produces an impression of greater originality than the Jewish, for (not to mention other points) in the former the order in which the birds are sent out is much more natural. On the other, the "ark," or rather "chest," of the Jewish narrative sounds more archaic than the "ship" of the Babylonian. The word for "deluge" in Genesis is also evidently archaic, as appears from the facts that it only occurs once again (Psalm xix. 3), and that the editor in Genesis needed to explain it by the word "water" (Gen. vi. 17, "the flood, viz., water"). It is possible, therefore, to hold that the Jewish story is a distinct outgrowth of a common Semitic tradition. It will be urged that "chest" may have been substituted for "ship" to avoid an anachronism, mankind in Noah's time not having perhaps reached the sea, and that the archaic word for "deluge" does not prove the antiquity of a developed deluge-story, also that there are traces in Genesis (see iv. 17-24, vs. 1-3) of another and presumably native Hebrew view, according to which the moral degeneration of man was explained without a deluge. The question is a large one, but may perhaps be reduced to this—Can the Yahvistic narrative in Genesis be safely broken up into several? There is some evidence, both internal and (see the prophetic references to Genesis) external to show that it can, but it would be premature in this place to pronounce whether the evidence is sufficient. It will hardly be possible, however, to derive the Yahvistic flood-story from Babylonian, and not the Elohist, as has been suggested, for though the former is nearest to the Babylonian story (e.g., it ascribes the flood entirely to a rain-storm, whereas the latter introduces also the waters below the firmament), the latter agrees with it in all essential points, and even in the minor point of the bitumen. Let it be remarked in passing that, even if the material of the biblical narratives be taken from the Babylonian, the former have received a peculiar and original stamp, both by their monotony and by the moral significance so emphatically given to the catastrophe, just as by the additions of the lovely story of the rainbow the Elohist has produced a conclusion far superior, artistically speaking, to that of his Babylonian predecessor.

III. Another of the great countries by which the rabbinites might have been influenced was Egypt; but in this, even more than in a former, case a direct Egyptian influence is out of the question. The deluge-story was entirely unknown in the Nile-valley. It is commonly said, but erroneously, that this was owing to the absence of real catastrophes of the nature of an inundation. But if the terrestrial deluge is really (see below) only a transformation of the celestial, there is no reason why the story should not have grown up in Egypt, if the imagination of its inhabitants had invited such a development; for the germ of the deluge-story certainly existed in Egypt. The Book of the Dead constantly refers to the god, Ra, as voyaging in a boat on the ocean, and a story in an inscription of the archaic period (Seti I) embodies a conception altogether analogous to that of the narrative in Genesis. According to this myth—which is described by M. Naville—Ra, the creator, being disgusted with the insolence of mankind, resolves to exterminate them. The massacre causes human blood to flow to Helopolis,
upon which Ra repents, and swears with uplifted hand not to destroy mankind again.

IV. The deluge-story exists in several forms in Indian literature. It does not, however, appear to be a genuine Aryan myth, for there is no clear reference to it in the Rig Veda. The 'Satapatha Brahmana, where it first occurs, was written (Weber) not long before the Christian era. Another version, in which the launcar of the earlier one are filled up, is given in the Mahabharata, but this poem, though it existed in part before the Christian era, did not assume its present form till long afterwards. A third version, still more decided Indian in character, is given in the Brahmanda Purana, but the earliest possible date of this work is the 12th century A.D., which deprives its account of the deluge of all claim to originality. It is worth noticing, however, that it agrees with the biblical narrative in two subordinate points—the introduction of animals into the ark or box, and the interval of seven days between the warning and its fulfillment. The principal feature of the oldest flood-story is the part assigned to the fish, which warns Manu of the deluge, and ultimately saves him by drawing his ship to a northern mountain. The selection of the fish (which is clearly divine) is so out of character with the most genuine portions of Aryan mythology that it proves the foreign origin of the Indian narrative, perhaps we may even say, of the Samitc origin. Not that the fish-god is peculiar to the Samitc world, but that he is un-Indian, and can so easily have reached India from a Semitic source. If the Indians sent apes, sandal-wood, and purple (both names and things) to Assyria, why should not the flood-story have been sent in exchange with other products of Mesopotamia? True, the fish does not appear in the present form of the Mesopotamian story, but it probably did appear in the original myth, for among the titles of the god who warned Tammuz (see above) are "fish of the abyss," "beneficient, savour fish." We admit the strong local colouring of the Indian story, which deceived even Weber (but not Burnouf), but this is exactly paralleled by the Hellenistic colouring (Bleek) of several South African stories of Christian origin. Whether the early Iranians had a flood-story is perhaps uncertain, since the Avesta gives but little information respecting mythology, and it has not come down to us complete. But none was known to the Persians about 100 B.C. (al-Butran). V. In Greece there appear to have been several floating flood-stories, which in time became localized and attached to the names of heroes. They all represent the flood as destroying all but a few men, and even in their least original forms they still contain many peculiar features which can only have arisen from an independent exercise of the mythopoetic faculty. The most famous of them is that of Deucalion, and of this the earliest and simplest form is in Pindar (Olymp. ix, 64), who identifies the mountain where Deucalion and Pyrrha landed, and where without marriage they "got themselves a race from stones" (Olymp. xi, 93). An earlier and more developed version (100 B.C.) has infused fresh life into this story, perhaps from a Semitic source; he extends the range of the flood to "most parts of Greece," and states that Deucalion (like Noah and Xisuthrus) offered sacrifices after the flood. Lucian (160 B.C.), laughing in his sleeve, gives a still more comically fantastic account (De dea Genetrix, xii, 18), in which we have for the first time a "great box," and of "children and wives," "swins and horses, and the kinds of lions and serpents, &c., all by pairs," as entering the ark. It was a confusion of this kind which led to the charge of Celsus, that the authors of the books of Moses had "put a new stamp on the story of Deucalion;"—reason sufficient for confining ourselves as much as possible to primitive versions of mythic narratives.

VI. America, which abounds in cosmogonies, is naturally not deficient in deluge-stories. Mr Catlin says, that "amongst 120 different tribes that he has visited in North and South and Central America, not a tribe exists that has not related to him distinct or vague traditions of such a calamity, in which one, or three, or eight persons were saved above the waters on the top of a high mountain" (Oepeka, p. 2). It is extremely difficult to tell how far Christian influences may have determined the form of these stories. When, for instance, we find such a peculiar point as the sending out the birds to see whether the flood had abated, we are disinclined to build any argument on the circumstances. We do find, it is true, strange points of agreement between the Greek and the Polynesian myths, yet considering the vast extent of Christian missionary activity in America, we are bound to special caution.

In addition to this, the American deluge-stories convey an impression that they have lost much of their original accuracy. The Polynesian myths, on the contrary, are still almost as transparent as ever. But we shall have occasion to speak of these presently.

 Instead of proceeding further with a detailed examination of myths, let us briefly touch on three general questions arising out of the subject. (1.) Is the deluge-story found among all nations? The Egyptians and (probably) the Persians had none, and it is doubtful whether it exists in non-Mahometan Africa. Probably, too, large deductions should be made from the myths of savage tribes, on the ground of Christian influences, even when related by well-informed travellers (2.) Was the deluge-story propagated from a single centre? An affirmative answer has often been returned, e.g., by Hagh Miller, Testimony of the Rocks, p. 232. It is impossible, however, to justify this from the mere fact of the superficial resemblance of the different narratives. These may be accounted for (on the ordinary historical theory of the flood-story) from the similarity of the circumstances of partial floods everywhere; or (if we regard it as based on a nature-myth) from the fact that, by a fundamental law of psychology, the universal wonders of nature everywhere receive (within certain limits) a similar mythic expression. Granting, therefore, in its fullest extent the non-originality of many deluge-stories, we maintain that the evidence points on the whole to the existence of several independent centres from which these stories were propagated. (3) Restricting ourselves to the consideration of the non-biblical forms of the narrative, we now inquire, what was their original significance? A provisional answer, it is true, has already been given, but one which does not account for the peculiar details of the most original deluge-stories. The only explanation of these which has yet been offered is derived from comparative mythology. It is agreed by mythologists that the exclusive subjects of really primitive traditional stories are frequently recurring natural phenomena. Consequently the elementary mythic descriptions or pictures of these phenomena, however the most available material, when, at a later period of mental growth, the attempt was made to construct a rude cosmogonical theory. Those "demolitions and reconstructions" of the world of which we spoke at the outset could only be narrated on the basis of these earliest, simplest, most primitive myths. What then was the natural phenomena which, in a mythic dress, formed the stratum of the deluge-stories? Not merely an annually recurring river-flood, such as those of the Euphrates, for the phenomenal basis of myths must be something strikingly wonderful as well as frequently recurring. This the inundations of a river are not, neither could they be regarded as calamities. But the phenomena of the sky and especially
of the sun are, to the primitive man, daily miracles. Hence the theory (Schirren and Gerland) that the deluge of the stories we are considering has been transferred from the sky to the earth, that it is in a word an ether-myth. This mode of explanation is not made by referring to quasi-historical details in the deluge-stories. For as soon as the mythic stage begins to be overtaken, rationalism appears. In this transitional period (commonly of long duration) the old nature-myths are modified. Some mythic elements remain, others are turned into prose. The attempt to explain the existence of the world on the basis of an ether-myth was an early symptom of the denaturalization of which we have spoken. At a still more advanced stage of the process, the flood often ceased to be universal, and was restricted to the home of those who related the story, or to the region from which they supposed themselves to have migrated. At last the shrewder intellects (e.g., among the Tahitians and some of the American Indians) even clutched at phenomena like those of fossil-shells found on hills to prove the literal truth of their deluge.

The most plausible arguments for the celestial deluge-theory are derived from the Polynesian mythology in the flood-story of Ioata, given by Ellis (Polynesian Researches, ii. 58-9), the flood rose "as the sun approached the horizon;" and the island where the fisherman found refuge is called Tua-marama, e.g., moon-tree (tree reaching up into the moon), which reminds us of the Tenteone workah-tree, Yggdrasill, and the mythic mountain of the Babylonians (see below) and other nations. At Hualiu the flood was even called "flood of the moon," and at New Zealand "flood of day's eye" (i.e., the sun). Schirren explains all these myths as pictures of sunset, just as he derives the cosmogonies from myths of sunrise. But most of them are more easily explained, with Gerland, as earthly myths. The sun and moon were imagined as peaks emerging out of a flood—sometimes as canoes, sometimes as a man and his wife—the sole survivors (except perhaps the stars, their children) from the inundation. There was, however, no fixity of meaning. The stars were sometimes regarded as ships, but so too were the clouds, "Tangolau's ships." The Babylonian story, as represented in the 11th Incahar lay, suggests a similar theory. The names of the hero and his father mean "the (morning) sun" and "the evening-glow." The flood is a rain-flood, and the "father of the rain" (cf. Job xxxvii. 28) is the celestial ocean, which in the original myth must have been itself the deluge and the "ship" in the like that we in the mythic sun-god voyages in the sea of ether. The mountain on which the survivors came to land was originally (as in Polynesia) the great mythic mountain (cf. the Aecadian *lurul korrau, "mountain of the east"), which joins the sky to the earth, and serves as an axis to the celestial vault. Traces of an ether-myth have also been discovered in the Indian deluge-story, as indeed is only natural if it be based on the Babylonian. In the Mahabharata, the divine fish has a horn issuing from his head, which reminds us of other horned deities, whose solar origin is admitted, such as male and the Berosan Oinates. (See also Schirren, Wanderungen der Neuzeit wanderer, p. 193, who is, however, too fanciful to be a safe guide).

Two points should be mentioned in conclusion. (1) Though a moral significance is by no means always attributed to the deluge, such an importance has been expected. In the Mahabharata (line 12,774) it takes the form not of retribution but of purification, which agrees with Plato's view (Timaeus, p. 22). We find it in America among the Quiches, but this may perhaps be a later addition, as is certainly the case in one of the forms of the Tartish myth (Watts, vi. 271). (2) The deluge is not always the last of those periodical destructions alluded to at the beginning of this article. A few races suppose the last link in the series to be a great fire which swept away living thing from the earth, except (as some American Indians say) a few who took refuge in a deep cave. This latter feature, however, has a slightly suspicious resemblance to Gen. xxx. 19, and, to say the least, the confabulation is not a myth of such proved antiquity and spontaneity as the deluge. It is too suggestive of artificial systems like that of the Sumerians. (2) More have been expected. In the flood-story of Ioata, the survivors (except those of the Old Testament, v. 190-201), Barrow, Athenagoras Parabola, 191, Wiltr., Indikals Studie, i, 191-223, Turnour, Mahatmav, i. 121 (referring to a local flood in its present form) Greek Prex, Aristot., 192-7, Vogel (Title). Romanus, summarised by L. Adam, Historie der philol., 9-14 Lap. Fries, Eupener Mythologie, reviewed in Lit. Correspond., March 1, 1878 America by Bancroft, Native Races, i, v 124-16, Schott's, Nota en de Tropen, p. 358 Polyneisa Schirren, Wanderungen der Neuzeit wanderer, Heng, 1850, Gerland, Warte A. Anthropologie, v. 295-7 Universal Turks, vol., *Keratia, Indien, etc., v. 92, K. L., the Traditionen des Menachenpublische (Munster, 1850) (U & C) DEMADES, an orator and demagogue who flourished in the 4th century B.C. He was originally of humble position, and was employed at one time as a common scribe, but he rose partly by his eloquence and partly by his unscrupulous character to a prominent position at Athens. He espoused the cause of Philip in the war against Olynthus, and was thus brought into bitter and lasting enmity with Demosthenes. Notwithstanding his sympathies he fought against Athens in the battle of Chaeronea, after which he was instrumental in procuring a treaty of peace between Macedon and Athens through his influence with Philip. He continued to be a favourite of Alexander, and, prompted by a bribe, saved Demosthenes and the other exiles from Athens. Demades from his very condescension his conduct in supporting the Macedonian cause, yet receiving any bribes that were offered by the opposite party, caused him to be heavily bribed more than once, and his flagrant disregard of law and honour ultimately led the citizens of Athens to pass a resolution expelling him from the city. This was recalled in 332 on the approach of Antipater, to whom the citizens sent Demades and Thracian ambassadors. Before setting out he persuaded the citizens to pass sentence of death upon Demosthenes and his followers who had fled from Athens. He thus made the Athenians and Antipater both succeed in bribing him to their cause, but the latter, discovering while Demades was with him on another embassy in 318 a correspondence which showed him to have been at the same time in communication with Perdiccas, put him to death along with his son Demes. A fragment of a speech bearing his name is to be found in the Ostraca Attica, but its genuineness is exceedingly doubtful.

DEMERARA, or DEMARY, a river and county of British Guiana. See GUIANA.


DEMETRIUS I, king of Macedonia, a son of Antigonus and Stratonice, or the Bear, but more properly called Antipater. Both father and son play an important part in the vicissitudes of the Macedonian empire after the death of Alexander the Great. Demetrios grew up to be a beautiful young man, reared in the fulness of the new Macedonian life, devoted to Greek science, and inspired with a high spirit and deep desire for glory. He united with those lofty aims a love of Oriental magnificence which formed at once the chief splendour and the principal weak-

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ness of his Macedonian prototype. At the age of twenty-two he was sent by his father against Ptolemy, who had invaded Syria; he was totally defeated near Gaza, but soon repaired his loss by a victory which he obtained over Cilices, in the neighbourhood of Mymus. After conducting an expedition against Babylon, and engaging in several campaigns against Ptolemy on the coasts of Cilices and Cyprus, Demetrius sailed with a fleet of 350 ships to Athens, and restored the Athenians to liberty, by freeing them from the power of Cassander and Ptolemy, and expelling the garrison which had been stationed there under Demetrius Phalereus. After this successful expedition he besieged and took Munychia, and defeated Cassander at Thermopylae. His reception at Athens, after these victories, was attended with the greatest servility; and under the title of "The Preserver" the Athenians worshipped him as a tutelary deity. In the next campaign he defeated Menelaus by land, and completely destroyed the naval power of Ptolemy. After an interval spent at Cyprus, he embarked and advanced the Rhodians for having deserted his cause; and his ingenuity in devising new instruments of siege, in his unsuccessful attempt to reduce the capital, gained him the appellation of Poloroctes. He returned a second time to Greece as liberator. But traces of Oriental despotism showed themselves, and the heartlessness and tyranny of Cassander; but Demetrius, after a protracted blockade, gained possession of the city, and pardoned the Seleucids, Cassander, and Lysimachus united to destroy Antigonus and his son. The hostile armies met at Ipeus, 301 B.C. Antigonus was killed in the battle, and Demetrius, after sustaining a severe loss, retired to Ephesus. This reverse of fortune raised him many enemies; and the Athenians, who had lately adored him as a god, refused even to admit him into their city. But he soon afterwards ravaged the territory of Lysimachus, and effected a reconciliation with Seleucus, to whom he gave his daughter Stratonice in marriage. Athens was at this time oppressed by the tyranny of Cassander; but Demetrius, after a protracted blockade, gained possession of the city, and pardoned the inhabitants their former misconduct. The loss of his possessions in Asia recalled him from Greece; and he established himself on the throne of Macedonia by the murder of Alexander, the son of Cassander, 294 B.C. But here he was continually threatened by Pyrrhus, who availed himself of his occasional absence to ravage the defenceless part of his kingdom; and at length the combined forces of Pyrrhus, Ptolemy, and Lysimachus, assisted by the disaffected among his own subjects, obliged him to leave Macedonia after he had sat on the throne for seven years. He passed into Asia, and attacked some of the provinces of Lysimachus with varying success; but famine and pestilence destroyed the greater part of his army, and he retired to the court of Seleucus to seek support and assistance. Here he met with a kind reception; but, nevertheless, hostilities soon broke out; and after he had gained some advantages, he was compelled to leave Thrace, and his son Antigonus offered Seleucus all his possessions, and even his person, in order to procure his father's liberty; but all proved unavailing, and Demetrius died in the fifty-fourth year of his age, after a confinement of three years, 284 B.C. His remains were given to Antigonus, honoured with a splendid funeral at Corinth, and thence conveyed to Demetrius. His posthumously remained in possession of the Macedonian throne till the time of Perseus, who was conquered by the Romans. See MACEDONIA.

DEMETRIUS II., king of Macedonia, son of Antigonus Gonnatas, who was a son of Demetrius Polorocetes. He occupied the throne for ten years, but little is known of him. His reign coincided with the period of the Achæan league, which was then strengthened by an alliance with the Athenians. Only a fragment of Macedonian power remained in Greece; a few towns in the Peloponnæus were held by Macedonian governors. Demetrius offered a slight opposition to the two patriotic leagues, and wrested Boeotia from the contents of the Achæan league. At his death in 252 B.C. Antigonus Doson undertook the government for his son Philip, who was under age.

DEMETRIUS I., named Soter, king of Syria, was sent to Rome as a hostage during the reign of Antiochus Epiphanes. He contrived, however, to escape from confinement, partly through the assistance of the historian Polybius, and established himself on the throne. He acquired his surname from the Babylonians on account of the expulsion of Heracleides from their capital, and is famous in Jewish history for his contest with the Maccabees. Demetrius fell in battle against the usurper Balas, about 150 B.C.

DEMETRIUS II., called Zenocrates, also Euterpes and Philometer, king of Syria, was the fourth son of Antiochus Grynus. By the assistance of Ptolemy Lathyrus he recovered part of his Syrian dominions from Antiochus Eusebes, and held his court at Damascus. He assisted the Jews against Alexander Janneus. In attempting to depose his brother Philip he was captured by the Arabs and Parthians and taken prisoner. He was kept in confinement in Parthia by king Mithridates until his death.

DEMETRIUS, an orator and Peripatetic philosopher, surnamed Phalerus, from the Attic deme of Phalerus, where he was born. He was the son of a poor man named Panaonestratos, and was a scholar of Theophrastus. He governed the city of Athens as representative of Cassander for ten years, and 360 statues were erected to his honour. On the restoration of the old democracy by Demetrius Poliorcetes, he was obliged to leave the city, and escaped into Egypt, where he was protected by Ptolemy Lagus. This king, it is said, having asked his advice concerning the succession of his children to the throne, was advised by Demetrius to leave his crown to the children of Eurydice, rather than to Philadelphus, the son of Berenice. This displeased Philadelphus so much, that when his father died he banished Demetrius; and the unhappy exilé put an end to his life by the poison of an ape (282 B.C.). Demetrius composed more works, in prose and verse, than any other Peripatetic of his time. His writings treated principally of poetry, history, politics, rhetoric, and accounts of emblems; but none are extant. The treatise Θεωρία, which is often ascribed to him, is probably the work of a later Alexandrian of the same name.

DEMETRIUS, a Cyric philosopher, was a disciple of Apollonius of Tyana, to whom he afterwards proved an able antagonist. He spent the greater part of his life at Corinth, and first became famous during the reign of Caligula. The emperor, wishing to gain the philosopher to his interest, sent him a large present; but Demetrius refused it with indignation, and said, "If Caligula wishes to bribe me, let him send me his crown." Vespasian was
On the manufacture of arms won him notoriety and fortune; and an iron foundry which he established for the Government became another source of wealth to him. Peter the Great, with whom he was a favourite, ennobled him in 1720.

II. DEMIDOFF, ALEXANDER, son of the former, greatly increased the wealth he had inherited by the discovery (along with his son) of gold, silver, and copper mines, which they worked with permission of the Government for their own profit. He died about 1740.

III. DEMIDOFF, PAUL, GRIGORIEVICH, nephew of the preceding (born in 1738, died in 1821), was a great traveller, from whom he was a favourite, ennobled in 1720. During the invasion of Napoleon he commanded a regiment equipped at his own expense. He also greatly increased his resources as a capitalist by successful mining operations, and like his uncle used his wealth tomultiply facilities for the scientific culture of the inhabitants of Moscow. The erection of four bridges at St Petersburg was mainly due to his liberality. In 1830 a collection of his pamphlets, Opuscules d'Économie Politique et Pratique, was published at Paris.

V. DEMIDOFF, ANATOLI, son of Paul, was born at Florence in 1812, and died at Paris in 1870. Educated in France, his life was chiefly spent in that country and in Italy. After his marriage with the daughter of Jerome Bonaparte, he lost in a time the favour of the Emperor Nicholas on account of provision having been made in the contract for the education of his children as Roman Catholics. During the Crimean war he was a member of the Russian diplomatic staff at Vienna. Like other members of his house, he expended large sums to promote education and to ameliorate the physical condition of his fellows. His munificence as a patron of art gave him European celebrity. The superb work, Voyage dans la Russie méridionale et la Crimée, par la Hongrie, la Valachie, et la Moldavie, was conjointly written and illustrated by him and the French scholars and artists who accompanied him. It has been translated into several European languages; the English version was published in 1853.

DEMIN, a town of Prussia, at the head of a circle in the government of Stettin, is situated on the Peene, which in the immediate neighbourhood receives the Trebel and the Tolleme, 72 miles W.N.W. of Stettin. It has manufactories of woolen cloths, linens, hosiery, besides breweries, distilleries, and tanneries, and an active trade in corn and timber. Demmin is a town of Slavonian origin and of considerable antiquity, and was a place of importance in the time of Charlemagne. It was besieged by a German army in 1145, and captured by Henry the Lion in 1164. In the Thirty Years' War it was the object of frequent conflicts, and even after the Peace of Westphalia was taken and retaken in the contest between the electoral prince and the Swedes. It passed to Prussia in 1720, and its fortifications were destroyed in 1759. In 1807 several engagements took place in the vicinity between the French and Russian Army Population in 1875, 9856.

DEMOCRITUS, one of the founders of the Atomic philosophy, was born at Abdera, a Thracian colony, the inhabitants of which were notorious for their stupidity. Nearly all the information that we possess concerning his life consists of traditions of very doubtful authenticity. He was a contemporary of Socrates, but the date of his birth has been fixed variously from 494 to 460 B.C. His father (who is called by no less than three names) was a man of such wealth as to be able to entertain Xenexes and his army on their return home after the battle of Salamis. On coming into his inheritance, Democritus, there is good reason to believe, devoted several years to travel. He visited the East, and is supposed with great probability to have spent a considerable time in Egypt. The intensity of his thinking was figured by the ancients in the story that he put out his eyes in order that he might not be diverted from his meditations. But of the way in which he obtained the vast learning for which he was famed, and of his intercourse with other philosophers, even with Leucippus, we have no certain information. According to one very doubtful tradition, he was so honoured in his native city that, his patrimony being all spent, the incredible sum of 500 talents was voted him by his fellow-citizens, together with the honour of a public funeral. But, according to Doegenes Laertius, no less that 72 works, treating of almost every subject studied in his time, and written in Ionic Greek, in a style which for poetic beauty Cicero deemed worthy of comparison with that of Plato. But of all these works nothing has come down to us beyond small fragments.

The cosmical theory propounded by Democritus—which in part at least was adopted from the doctrines of Leucippus and of all the materialists of the world—is, in fact, no one of the universe put forth by the Greeks the one which has held the most permanent place in philosophical thought. All that exists is vacuum and atoms. The atoms are the ultimate material of all things, including spirit. They are uncaused, and have existed from eternity. They are indivisible, but extended, heavy, and impenetrable. They vary in shape, although Democritus held that they vary also in density is debated. And, lastly, these atoms are in motion. This motion, like the atoms themselves, Democritus held to be eternal. According to some, he explained it as caused by the downward fall of the heavier atoms through the lighter, by which means a lateral whirling motion was produced; but whether this explanation was given by Democritus is extremely doubtful. Another principle also is said by some to have been used by Democritus to explain the concurrence of the atoms in certain ways, viz., that there is an innate necessity by which similar atoms come together. However this may be, he did declare that by the motion of the atoms the world was produced with all that it contains.

Soul and fire are of one nature, the atoms of which they consist are small, smooth, and round; and it is by inhaling and exhaling such atoms that life is maintained. It follows that the soul perishes with, and in the same sense, the distinction made between the principle of life and the higher mental faculties.

The Atomic theory of perception was as follows. From
every object (or images) of the object are continually being given off in all directions; these enter the organs of sense, and give rise to sensation. The rest of the theory of the mind emphasizes certain ancient and modern theories of perception (1) by its reduction of all sensation, on the objective side, to touch, and (2) by the distinction which it involves between the qualities of extension and resistance, which are said to be the only qualities that really belong to objects of sense, and the other (or secondary) qualities, which are said to exist only through the action of the organs of sense modifying the images.

Sensation, Democritus appears to have taught, is our only source or faculty of knowledge; indeed his first principles admit the existence of no mental faculty of a nature distinct from sensation. He was classed among the most extreme sceptics of antiquity, and tradition attributes to him such sayings as—"There is nothing true, and if there is, we do not know it," "We know nothing, not even if there is anything to know."

The system of Democritus was altogether anti-theological. He denied that the creation of the world was in any way divinely managed. He also rejected all the popular mythology; but, according to one account, he taught that, as men were produced by the motion of the atoms, so was produced a race of grander beings, of similar form, and, though longer-lived, still mortal, who influence human affairs, some benevolently, some malevolently, and who appear to us in dreams.

The moral system of Democritus is strikingly like the negative side of the system of Epicurus. The summum bonum is placed in an even tranquillity of mind. Fear, and too strong desire, and all that is likely to bring sorrow or even care, are to be avoided, as, for example, notably marriage, to which Democritus cherished the strongest objections. This habit of mind Democritus is said to have himself so well attained that the merry spirit with which he regarded all that happened earned him the title of "the laughing philosopher." Another version, however, asserts that he received the name on account of the scorn which he poured on human ignorance and weakness.


DEMOIVRE, ABRAHAM (1667-1754), an eminent mathematician, was born at Vitry, in Champagne, May 26, 1667. He belonged to a French Protestant family, and was compelled to take refuge in England at the revocation of the Edict of Nantes, in 1685. Having laid the foundation of his mathematical studies in France, he proceeded them further in London, where he read public lectures on natural philosophy for his support. The Principia Mathematica of Newton, which chance threw in his way, made him comprehend at once how little he had advanced in the science which he professed; but he pursued his studies with vigour, and soon became distinguished among first-rate mathematicians. He was among the intimate personal friends of Newton, and his eminence and abilities secured his admission into the Royal Society of London, and afterwards into the Academies of Berlin and Paris. His merit was so well known and acknowledged by the Royal Society that they paid him a fit reward, to decide the famous contest between Newton and Leibnitz. The life of Demovre was quiet and uneventful. His old age was spent in obscure poverty, his friends and associates having nearly all passed away before him. He died at London, November 27, 1754.
The doctrine of demons served in the philosophy of the primitive and savage world, as well as its large contribution to civilized superstition. The authorities, when not mentioned, will mostly be found referred to in Taylor, Primitive Culture, chaps. xiv. xv. Other cases are given in Spencer, Principles of Sociology, vol. i., and every reader may supplement them with similar instances from the works of travellers and missionaries. Prof. Adolf Bastian's Der Mensch in der Geschichte and Beiträge zur Ethnologie. Psychologie are of great value to students.

Among races of low culture, the conception of a ghost-soul being made to account for the phenomena of life (see article ANIMISM) readily leads to a corresponding theory of morbid states of body and mind. As the man's proper soul causes the functions of normal life by its presence, while its more or less continued absence induces sleep, trance, and at last death, so the abnormal phenomena of disease have a sufficient explanation at hand in the idea that some other soul or soul-like spirit is acting on or has entered into the patient. Among these races no one more strongly suggests this are—first, such derangements as hysteria, epilepsy, and madness, where the raving and convulsions seem to be Styerpe like the acts of some other being in possession of the patient's body, and even the patient is apt to think so when he "comes to himself," and, second, internal diseases where severe pain or wasting away may be referred to some unseen being wounding or gnawing within. The applicability of demoniacal possession as a theory to explain diseases in general is best proved by the fact that it is so often thus applied by savage races. Especially, reasoning out the matter in similar ways, rude tribes in different countries have repeatedly arrived at the conclusion that diseases are caused by the surviving souls or ghosts of the dead, who appear to the living in dreams and visions, thus proving at once their existence after death, and their continued concern with mankind. This notion being once set on foot, it becomes easy to the savage mind to identify the particular spirit, as when the Tasmanian ascribes a gnawing disease to his having unwarrantedly pronounced the name of a dead man, who thus summoned has crept into his body, and is consuming his liver; or when the sick Zulu believes that some dead ancestor he sees in a dream has caused his ailment, wanting to be propitiated with the sacrifice of an ox; or when the Samoan persuades himself that the ancestral souls, who on occasion reveal themselves by talking through the voices of living members of the family, are the same bodies which will take up their abode in the heads or stomachs of living men and cause their illness and death. Here, then, the demon appears in what seems its original character of a human ghost. We may notice in the last example the frequent case of the man's mind being so thoroughly under the belief in a spirit possessing him that he speaks in the person of that spirit, and gives its name; the bearing of this on onacular possession will appear presently.

In many, perhaps in most cases, however, the disease-demon is not specially described as a human ghost; for instance, some Malay tribes in their simple theory of disease suppose our soul to be the palpable causative thing, and every disease which they will take up their abode in the heads or stomachs of living men and cause their illness and death. Here, then, the demon appears in what seems its original character of a human ghost. We may notice in the last example the frequent case of the man's mind being so thoroughly under the belief in a spirit possessing him that he speaks in the person of that spirit, and gives its name; the bearing of this on onacular possession will appear presently.

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to notice how gradual the change of opinion has been from the doctrine of demon-possession to the scientific theory of disease, and how largely the older view still survives in the world. Not only in savage districts, but in countries whose native civilization is below the European level, such as India and China, the curious observer may still see the exorcist expel the malignant ghost or demon from the patient afflicted with fever, dizziness, frenzy, or any unexplained ailment. (See Ward, 'History of the Hindus,' vol. i. p. 155; vol. ii. p. 183; Roberts, 'Oriental Illustrations of the Scriptures,' p. 529; Doolittle, 'Social Life of the Chinese.') The unbroken continuity of the belief in mediæval Europe may be gathered from such works as the excellent treatise by Maury, 'La Magie et l'Astrologie dans l'Antiquité et au Moyen Age,' already referred to. Even in the 18th century was published with ecclesiastical approval a regular exorcist's manual, the 'Pactis et Flagellum Daemonorum,' Autors R.P.F. Hieronomino Mengo (1727), which among its curious contents gives instructions how to get the better of those cunning demons who are bound to the Rabbinal power to torment them with diseases and their attendant discomforts. The gradual shifting of opinion is marked by the attempt to reconcile the older demonology with the newer medicine. This argument, which appears among the early Christian fathers, is worked out most elaborately in that curious museum of demonology, the 'Disquisitiones Magicae' of Martin Delrio, published as late as 1720. While inveighing against those physicians who maintain that all diseases have natural causes, this learned Jesuit, admits that men may be dumb, epileptic, or lunatic without being possessed; but what the demons do is that, finding the disposition of epileptics suitable, they instigate themselves into them; also they attack lunatics, especially at full moon, when their brains are full of humours, or they introduce diseases by stirring up the black bile, sending blacks into the brain and cells of the nerves, and setting obstructions in the ears and eyes to cause deafness and blindness. Looking at the date of this celebrated work, we cannot wonder that in benighted districts of Europe the old diabolical possession and its accompanying exorcism may still now and then be met with, as in 1861 at Morzine in Savoy.1 (See A. Constans, 'Relation sur une Epidémié d'Hydro-Démonopathie,' Paris, 1863.) One of the last noted cases of this kind in England was that of George Lincoln of Yatton, a knavish epileptic out of whom seven devils were exorcised by seven clergymen, at the Temple Church at Bristol, on June 13, 1788. (See Eclog. Brit. 3d to 6th editions, art. "Possession").

The derivation of the ideas of demons from the phenomena seen in dreams has already been instance where the apperition is that of a dead man, but there are peculiar kinds of demons which are to be considered specially from this point of view. "In savage animism, as among the Australians, what we call a nightmare is of course recognized as a demon; and though we have long learnt to interpret it subjectively as arising from some action of the sleeper's soul, and from the impression that its name remains proof of the same idea among our ancestors (Anglo-

1 The Times, in November 1876, contains an account in the casting out of devils by a priest in the Church of the Holy Spirit in Bar-
castle, on the 24th of the preceding month. On one occasion the priest, in the church, at the altar, was accused of having a young woman of seventeen or eighteen, lay on the floor before the altar, withing in convulsive with distorted features and foaming at the mouth, while the priest seated and purifying himself; few, whom he addressed by the name of Rosabel, the di-Saint's answers being of course spoken by the voice of the saintly girl herself. At last a number of devils were supposed to come out of the patient, and such scenes were repeated for days in the presence of many spectators till a rust arose, and the civil authorities intervening put a stop to the whole affair.
have been from the infancy of culture, may be well shown by the permanence of the practice of holding at intervals such special ceremonies to expel them. In Siam the people first hunt the demons out of the houses, and then drive them with cannon-shots through the streets till they get them outside the walls into the forest. In Old Calabar they put puppets along the streets leading to the sea, to entice the demons into, and then at dead of night a sudden rush is made by the negroes with whips and torches to drive the spirits down into the sea. Not only do other barbaric regions, such as the South Sea Islands and Peru, furnish similar examples of the expulsion of demons, but it may still be seen among European peasantry. In Sweden, Easter-tide is the season for a general purging of the land from the evil spirits and terrors of the old heathendom, and in many parts of Germany unseen witches are to this day driven out on Walpurgis-night with crack of whip and blast of horn (See a collection of cases in Bastian and Hartmann, Zentralrity für Ethnologie, 1869, p. 189, also Hylden-Cavalius, World and Wonders, part I, p. 178). In these cases it is generally unfavourable influences which are considered due to the demons. But favourable events are often by savages often recognized as due to the intervention of some kindly spirit, and especially to a guardian or patron demon, whose help accounts for what among ourselves is often not much more rationally considered to be “lucky.” It is often a recognized ancestral soul which from natural affection undertakes this duty, as when a Tasmanian has been known to account for escape from danger by the idea that his father’s soul was still watching over him. But it need not be so, and among the American Indians or West Africans, where each man lives in constant imaginary intercourse with his patron-spirit, talking with it, making it offerings, and trusting to its guidance in difficulty and protection from danger, this spirit may be revealed in a dream or vision, and is often connected with some object known as a “medicine” or “fetish,” but is seldom identified with any particular ghost. In Greek literature this idea is best exemplified by the lines of Menander on the good demon whom every man has from birth as his guide through the mysteries of life (ap. Clem. Alex., Stromat. v.), the most popularly known example is the so-called “demon” of Socrates, but he himself did not give such personal definiteness to the divine or demonic influence (βασιλικόν) which warned him by what he described as a voice or sign (see Zeller, Socrates, ch. 4). The primitive idea of the patron-spirit is carried on in the Roman genius, whose name (even without the addition of “natalis”) indicates that it is born with the person whom it accompanies through life. Its place very closely corresponds to that occupied in modern folklore by the guardian angel. There are districts in France where a peasant meeting another, salutes not only the man, but his “companion,” the guardian angel who is supposed to be invisibly at his side. Among attendant and patron demons, as recognized in the general belief of mankind, a specially important class is formed by the familiar spirits who accompany sorcerers, giving them mysterious knowledge, uttering oracular responses through their voices, enabling them to perform wonderful feats, bringing them treasure or injuring their enemies, and doing other spiritual services for them. From the descriptions of sorcerers among the lower nations, it is at once evident that the supposed intercourse with demons is closely connected with the symptoms of disease- possession. Thus among the Zulus, “the disease which precedes the power to divine” is distinctly hysterical, the patient’s morbid sensitiveness and intense vivid imagination of sights and voices fitting well with his persuasion that he is under the control of some ancestral ghost. So well is this connection recognized among races like the Patagonians and rude tribes of Siberia, that children with an hereditary tendency to epilepsy are brought up to the profession of magicians. Where the sorcerer has not naturally such symptoms of possession by a controlling demon, he is apt to bring them on by violent dancing and beating drums, or by drugs, or to simulate them by mere knavery, which latter is really the most convincing proof that the original notion of the demon of the magician did not arise from imposture, but from actual belief that the morbid excitement, hallucination, and raving consequent on mental disease were caused by spirits other than the man’s own soul, in possession of his body. The primitive and savage theory of inspiration by another spirit getting inside the body is most materialistic, and cheating sorcerers accordingly use ventriculopneum of the original kind, which (as its name implies) is supposed to be caused by the voice of a demon inside the body of the speaker, who really himself talks in a feigned human voice, or in speaking or whistling tones thought suitable to the thin-bodied spirit-visitor. The familiar spirit may be a human ghost or some other demon, and may either be supposed to enter the man’s body or only to come into his presence, which is somewhat the same difference as whether in disease the demon “possesses” or “observes” a patient, i.e., controls him from inside or outside. Thus the Greenland angelk, or sorcerer, is described as following his profession by the aid of a toangal, or familiar spirit (who may be an ancestral ghost), whom he summons by drumming, and with whom he is heard by the bystanders to carry on a conversation within the hut, obtaining information which enables him to advise as to the treatment of the sick, the prospect of good or bad weather, and the other topics of the business of a soothsayer. Passing over the intermediate space which divides the condition of savages from that of medieval or modern Europeans, we shall find, so far as the doctrine of familiar demons has survived, that it has changed but little in principle. In the witch trials a favourite accusation was that of having a familiar demon Sir Walter Scott’s Demonology and Witchcraft contains among others the case of Bessie Dunlop, whose familiar was the ghost of one Thorne Reid, killed at the battle of Pinkie (1547); who enabled her to give answers such as consulted her about the ailments of human beings, or cattle, or the recovery of things lost or stolen. This miserable woman, chiefly on her own confession, was as usual “convinced and burnt.” Here the imagined demon was a human soul, but other spirits thus attended sorcerers and diviners, such as the spirit called Hudhut, who enabled a certain Highland woman to prophesy as to the conspiracy to murder James I of Scotland. Dissertations on the art of raising demons for the sorcerers’ service, and even the actual charms and ceremonies to be used, form a large part of the precepts of magical books (See Ennomos, History of Magic, Horst, Zauberbiblilhek, and other works already cited.) Among the latest English books treating seriously of this “black art” is Sibly’s Illustration of the Occult Sciences, of which a 10th edition, in 4to, bears date London, 1807. The statute of James I. of England enacted that all persons invoking any evil spirit, or consulting, covenanted with, entertaining, employing, feeding, or rewarding any evil spirit, should be guilty of felony, and suffer death. This was not repealed till the reign of George II. Educated public opinion has now risen above this level; but popular credulity is still to be worked upon by much the same means as those employed by savage sorcerers professing intercourse with familiar spirits. At “spiritualistic seances” the communicative and hysterical medium is supposed to speak in the voice of the “medium” under the “control” of his “guiding spirit” are much the same as those which
Purity, Anra-mainyu (spirit) doctrines of the good and evil deities, Ahuramazda and the legions as in Brahmanism and self up above his place; they make the son of the house assail country after country; they make the slave set

... carry on after death their friendly or causes of evil are assigned to them is well shown by the translation of the Eg?lpt's Place Egyptians the misery would be unbearable did not Suku-Vakange from with his bolts; then he returns to rest and leaves the... 

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... demons. When a man dies, while the feigned voice, supposed to indicate that it is some while the ghosts of... 

... translations, such as thumping and drumming in the dark, are those usual in the performances of the Siberian shamans, who also, in common with the Greenland angekoks, impose on the bystanders by the miraculous performance of the "rope-trick;" the "planche-motion," by the guiding band of a familiar spirit, has long been done by an inferior class of magicians in China. The crowning incident in the English proceedings is the "materialization" of the familiar spirit in a dimly-seen figure which, when a rush is made to seize it, proves to be a doll or the medium himself in drapery.

Returning to the general theory of demonology, two important principles have to be brought together under notice. As the religions of the world become more completely organized, the various kinds of spirits divide into orders or ranks of a hierarchy; while with the growth of dualism the class of demons further arrange themselves as at first the opposite camps, under the preceding good and evil deities. The way in which such views may be developed is well seen in Bishop Callaway's Religion of the Amazulu, among whom the ancestral ghosts (amantongo) carry on after death their friendly or hostile character, so that in general the ghosts of a man's own family or tribe are friendly demons helping him and fighting on his side, while the ghosts of enemies remain hostile demons. In the religion of Congo, according to Magyar (Reisen in Sud-Africa, 1849-57), the highest deity, Suku-Vakange, takes little interest in mankind, and the real government of the world belongs to the good and bad kikulu,—spirits or demons. When a man dies, according to his circumstances in life he becomes a friend or enemy of the living, and thus passes among the good or bad kikulu. But as there are more bad spirits who torment than good who favour, man's misery would be unbearable did not Suku-Vakange from time to time, enraged at the wickedness of the evil spirits, terrify them with thunder and smile the more obstinate with his bolts; then he returns to rest and leaves the demons to rule again. In the religion of the ancient Egyptians the dualistic system is worked out in the antagonism between the gods of light and the evil powers under the serpent Apap, whose long undulating form may be seen in those portions of the pictorial ritual of the dead which are generally supposed to be borrowed from the mummy case. (See Burch's translation of the Book of the Dead, in vol. v. of Bunsen, Egypt's Place in Universal History.) In the ancient Babylonian system the demons were classified in orders, and the minuteness with which their functions as personal causes of evil are assigned to them is well shown by the following passage from a cuneiform inscription:—"They assail country after country; they make the slave set himself up above his place; they make the son of the house leave his father; they make the young bird fly out of its nest; they make the ox and the lamb run away—the evil demons who set snares " (Lenormant, p. 29.) In Brahmanism and Buddhism which sprang from it, as well as in the ancient Persian religion, the various orders of spirits who come under the general definition of demons have large place. The latter faith, as represented in the Zend-Avesta, worked out to its extreme development the doctrines of the good and evil deities, Ahuramazda and Anra-mainyu (Ormuzd and Ahriman), which still remain as the fundamentals of the armies of spirits or demons, those of light, purity, and goodness being met in endless contention by the legions of darkness who seek to undo all good and spread foulness and sin around them. This remarkable system exercised strong influence on religions of later civilization. The later Jewish or Talmudic ideas are strongly leavened by it, and to it is in great measure due the rise of the Manichean doctrine. The demonology of these systems may best be studied as part of the Christian doctrine, while their relation to the angelology and demonology of Christianity belongs to Christian theology. Though in this short notice only a few illustrative cases are given as to the belief in demons, the great mass of details of the kind in the various religions of the world will be found to conform with them both as to the notion of demons being derived from the idea of the human soul, and as to their function in primitive philosophy being to serve as personal causes of events. The principles of demonology thus form an interesting branch of intellectual history. But beside this, its names and formulas transmitted as they have been by the blind reverence of generations of magicians, preserve for the historical student some curious relics of antiquity. As a pendant to the already-mentioned Talmudic Leith, the female nocturnal demon of ancient Assyria, may be noticed Asmodeus, famous in Le Sage's novel Le Diable Boiteux, who is not only to be found in the Talmud but also in the Arabian Nights. The name of Solomon (see Eisenmenger, Entdeckte Judenthum), but may be traced back still farther to his real origin in Acmna daeva, one of the evil demons of the ancient Persian religion. The conjurations and formulas for raising demons in the curious old book of magic which bears the name of Doctor Faustus (see reprint in Hours) are a wonderful medley of scraps from several religions. Their principal source, beside Christian invocations and fragments of ritual, is Hebrew, whether biblical or from the latest Rabbinical books; Aziel, Faust's own familiar, chosen because he can do his errands swiftly as thought, is apparently the fallen angel Azael of the Talmud, to whom Solomon goes every day for wisdom; Michael, Raphael, Uriel, and Gabriel guard the four quarters of a mystic demon-circle while the names of Satan and Pluto, Ariel and Hesper Petrus and Adonis, figure among incantations in dog-Latv and good high Dutch, and a mass of words reduced to gibberish beyond comprehension. The study of demonology also brings into view the tendency of hostile religion to degrade into evil demons the deities of a rival faith. The ancient schism between two branches of the Aryan race, which separated the Zarathustrian religion from the Vedic religion, now represented by Brahmanism, is nowhere better marked than in the fact that the deus, the bright gods of the Hindoos, have become the demons of the Persian. So the evil beings recognized in the folk-lore of Christendom are many of them the nature spirits, lares, and other deities of the earlier heathendom not discarded as imaginary, but lowered from their high estate and good repute to swell the crowd of hateful demons...
teens years had learned Latin, Greek, and some Hebrew, in addition to acquiring much general knowledge. At the age of sixteen years and a half he entered Trinity College, Cambridge, and studied mathematics, partly under the tuition of Airy, subsequently the astronomer royal. In 1822 he gained a Trinity scholarship. De Morgan's attention was by no means confined to mathematics, and his love of wide reading somewhat interfered with his success in the mathematical tripos, in which he took the fourth place in 1827, before he had completed his twenty-first year. He was prevented from taking his M.A. degree, or from obtaining a fellowship, to which he would doubtless have been elected, by his conscientious objection to signing the theological tests then required from masters of arts and fellows at Cambridge. A strong repugnance to any sectarian restraint upon the freedom of opinion was one of De Morgan's most marked characteristics throughout life.

A career in his own university being closed against him, he entered Lincoln's Inn; but had hardly done so when the establishment, in 1829, of the university of London, in Gower Street, afterwards known as University College, gave him an opportunity of continuing his mathematical pursuits. At the early age of twenty-two years he gave his first lecture as professor of mathematics in a college which he served with the utmost zeal and success for a third of a century. His connection with the college, indeed, was interrupted in 1831, when a disagreement with the governing body caused De Morgan and some other professors to resign their chairs simultaneously. When, in 1836, his successor Mr. White was accidentally drowned, De Morgan was requested to resume the professorship. It may be added that his choice for literary and scientific careers was made against the advice of his relatives and friends, who, on his entering Lincoln's Inn, confidently anticipated for him a distinguished and lucrative career at the bar.

In 1837 De Morgan married Sophy Elizabeth, daughter of William Frend, a Unitarian in faith, a mathematician and actuary in occupation, a notice of whose life, written by his son-in-law, will be found in the Monthly Notices of the Royal Astronomical Society (vol. v.). Henceforward De Morgan's life is scarcely more than a record of his constant labours, and his innumerable publications. As in the case of many scholars, the even tenor of his life was unbroken by remarkable incidents. Surrounded by a growing family, ultimately seven in number, he sought happiness in his home, in his library, and in the energetic and vigorous discharge of his college duties. He seldom travelled or enjoyed relaxation, and could with difficulty be induced to remain many days from home.

As a teacher of mathematics De Morgan was unrivalled. He gave instruction in the form of continuous lectures delivered extemporaneous from brief notes. The most prolonged mathematical reasoning, and the most intricate formulae, were given with almost infallible accuracy from the resources of his extraordinary memory. De Morgan's writings, however excellent, give little idea of the perspicacity and elegance of his written expositions, which never failed to fix the attention of all who were worthy of hearing him. Many of his pupils have distinguished themselves, and, through Mr. Todhunter and Mr. Routh, he has had an important influence on the modern Cambridge school. In addition to occasional extra courses, it was his habit to give two lecture meetings, or sessions, of thirty weeks or more. Each lecture was exactly one hour and a quarter in length, and at the close a number of questions and problems were always given, to which the pupils returned written answers. These were all corrected by the professor, with hints, and personal explanations given before or after the lecture.

Although the best hours of the day were thus given to arduous college work, his public labours in other directions were extensive. For thirty years he took an active part in the business of the Royal Astronomical Society, editing its publications, supplying obituary notices of members, and for 18 years acting as one of the honorary secretaries. His work for this society alone, it is said, would have been occupation enough for an ordinary man. He was also frequently employed as consulting actuary, a business in which his mathematical powers, combined with sound judgment and business-like habits, fitted him to take the highest place.

De Morgan's mathematical writings contributed powerfully towards the progress of the science. His memoirs on the "Foundation of Algebra," in the 7th and 8th volumes of the Cambridge Philosophical Transactions, contain some of the most important contributions which have been made to the philosophy of mathematical method, and Sir W. Rowan, Hamilton, in the preface to his Lectures on Quaternions, refers more than once to those papers as having led and encouraged him in the working out of the new system of quaternions. The work on Trigonometry and Double Algebra, published by De Morgan in 1840, contains in the latter part a most luminous and philosophical view of existing and possible systems of symbolic calculus. But De Morgan's influence on mathematical science in England can only be estimated by a review of his long series of publications, which commence, in 1828, with a translation of part of Bourdon's Elements of Algebra, prepared for his students. In 1830 appeared the first edition of his well-known Elements of Arithmetic, which has been widely used in schools, and has done much to raise the character of elementary teaching. It is distinguished by a simple yet thoroughly philosophical treatment of the ideas of number and magnitude, as well as by the introduction of new abbreviated processes of computation, to which De Morgan always attributed much practical importance.

Second and third editions were called for in 1832 and 1835, and more than 20,000 copies have been sold; the book is still in use, a sixth edition having been issued in 1876.

De Morgan's other principal mathematical works were The Elements of Algebra, 1831, a valuable but somewhat dry elementary treatise, the Essay on Probabilities, 1838, forming the 107th volume of Lardner's Cyclopaedia, still much used, being probably the best simple introduction to the theory in the English language, and The Elements of Trigonometry and Analytical Geometry, preliminary to the Differential Calculus, 1837.

Several of his mathematical works were published by the Society for the Diffusion of Useful Knowledge, of which De Morgan was at one time an active member. Among these may be mentioned the great Treatise on the Differential and Integral Calculus, 1842, which still remains the most extensive and complete English treatise on the subject; the Elementary Illustrations of the Differential and Integral Calculus, first published in 1855, but often bound up with the larger treatise, the valuable essay, On the Study and Difficulties of Mathematics, 1831; and a brief treatise on Spherical Trigonometry, 1834. By some accident the work on probability in the same series, written by Lubbock and Drinkwater, Bethune was attributed to De Morgan, an error which seriously annoyed his many days of the six weeks' vacation described in his autobiography. For fifteen years he did all in his power to correct the mistake, and finally wrote to the Times to disclaim the authorship. (See Monthly Notices of the Royal Astronomical Society, vol. xxvi. p. 118.)

Two of his most important treatises are to be found in the Encyclopaedia Metropolitana, namely, the articles on the VIL — 9
Calculus of Functions, and the Theory of Probabilities. The former article contains a profound investigation into the principles of symbolic reasoning; the latter is still the most complete mathematical treatise on the subject in the English language, giving as it does a resume of Laplace's *Théorie Analytique des Probabilités*. De Morgan's minor mathematical writings are scattered over various periodicals; five papers will be found in the *Cambridge Mathematical Journal*, ten in the *Cambridge and Dublin Mathematical Journal*, several in the *Philosophical Magazine*, while others of more importance are printed in the *Cambridge Philosophical Transactions*. A list of these and other papers will be found in the *Royal Society's Catalogue*, which contains 42 entries under the name of De Morgan.

In spite of the excellence and extent of his mathematical writings, it is probably as a logical reformer that De Morgan will be best known to future times. In this respect he stands alongside of his great contemporaries Hamilton and Boole, as one of several independent discoverers of the all-important principle of the quantification of the predicate. Unlike most mathematicians, De Morgan always laid much stress upon the importance of logical training. In his admirable papers upon the modes of teaching arithmetic and geometry, originally published in the *Quarterly Journal of Education* (reprinted in *The Schoolmaster*, vol ii.), he resounded against the neglect of logical doctrine. In 1839 he produced a small work called *First Notions of Logic*, giving what he had found by experience to be much wanted by students commencing logic.

In October 1846 he completed the first of his original investigations, in the form of a paper printed in the *Transactions of the Cambridge Philosophical Society* (vol. viii. No. 29). In this paper the principle of the quantified predicate was referred to, and there immediately ensued a memorable controversy with Sir W. Hamilton regarding the independence of De Morgan's discovery, some communications having passed between them in the autumn of 1846. The details of this dispute will be found by those interested in the original pamphlets, in the *Athenæum* newspaper, or in the appendix to De Morgan's *Formal Logic*. Suffice it to say that the independence of De Morgan's discovery was subsequently recognized by Hamilton, and that those acquainted with De Morgan's character could never suppose that it was otherwise. Moreover, the eight forms of proposition adopted by De Morgan as the basis of his system may well differ from those which Hamilton derived from the quantified predicate. The general character of De Morgan's development of logical forms was wholly peculiar and original on his part.

Not a year passed before De Morgan, late in 1847, published his principal logical treatise, called *Formal Logic*, or the *Calculus of Inference, Necessary and Probable*. This contains a reprint of the *First Notions*, an elaborate development of his doctrine of the syllogism, and of the numerically definite syllogism, together with chapters of great interest on probability, induction, old logical terms, and fallacies. The severity of the treatise is relieved by characteristic touches of humour, and by quaint anecdotes and allusions furnished from his wide reading and perfect memory.

There followed at intervals, in the years 1850, 1858, 1860, and 1865, a series of four elaborate memoirs on the "Syllogism," printed in volumes ix. and x. of the *Cambridge Philosophical Transactions*. These papers taken together constitute a great treatise on logic, in which he substituted improved systems of notation, and developed a new logic of relations, and a new onymatic system of logical expression. Apart, however, from their principal purpose, these memoirs are replete with acute remarks, happy illustrations, and abundant proofs of De Morgan's varied learning. Unfortunately these memoirs are accessible to few readers, otherwise they would form invaluable reading for the logical student. In 1860 De Morgan wished to render their contents better known by publishing a *Syllabus of a Proposed System of Logic*, from which may be obtained a good idea of his symbolic system, but the more readable and interesting discussions contained in the memoirs are necessarily omitted. The article "Logic" in the *English Cyclopaedia* (1860) completes the list of his logical publications.

Throughout his logical writings De Morgan was led by the idea that the followers of the two great branches of exact science, logic and mathematics, had made blunders,—the logicians in neglecting mathematics, and the mathematicians in neglecting logic. He contributed to exhibit the real analogy between quantitative and qualitative reasoning, which is rather to be sought in the logical works of Boole. (See *Boole*, vol. iv. p. 47.)

Perhaps the largest part, in volume, of De Morgan's writing remains still to be briefly mentioned; it consists of detached articles contributed to various periodical or compendious works. During the years 1833-43, he contributed very largely to the first edition of the *Penny Cyclopaedia*, writing chiefly on mathematics, astronomy, and geography. His articles of various length cannot in number be less in number than 850, as may be ascertained from a *Syllabus* of them, and in the attempt showed how many errors an acute mathematician could detect in logical writings, and how large a field there was for discovery. But it may be doubted whether De Morgan's own system, "horrors with mysterious epicsules," as Hamilton aptly described it, is fitted to exhibit the real analogy between quantitative and qualitative reasoning, which is rather to be sought in the logical works of Boole. (See *Boole*, vol. iv. p. 47.)

Among De Morgan's miscellaneous writings may be mentioned his *Explanations of the Ordnance Survey Descriptions of the New Almanacs*, including a description of the maps of the stars, published by the *Useful Knowledge Society*; his *Treatise on the Globe, Celestial and Terrestrial*, 1845; and his remarkable *Almanacks* (second edition 1871), which contains a series of 35 almanacks, so arranged with indices of reference, that the almanack for any year whether in old style or new style from ancient or modern, up to 2000 a. d. may be found without difficulty, means being added for verifying the almanack and also for discovering the days of new and full moon from 2000 a. d. to 2099 a. d. De Morgan expressly draws attention to the fact that the plan of this book was that of Francis and Ferguson, but the plan was developed by one who was unrivalled master of all to reason of chronology. The two best tables of logarithms, the small figure tables of the *Useful Knowledge Society* (1839 and 1852), Sir Rowan's Seven Figure-Table (5th ed. 1865), were prepared under De Morgan's superintendence. Several works edited, and be found mentioned in the *British Museum* cited under numerous anonymous contributions through A to B, in the *Athenæum*, and to *Notes and Queries*, almanacs. His articles in the *North British Review*, *Macmillan's* are of value. Articles must be passed over with this bare mention. His occasional Considerable labour was spent by De Morgan *Morgan's, Dec.* of decimal money. He was a great advocate of the metric system. His evidence on this subject upon the subject before the *Lloyd's Commission*, and, besides the documents given in the *Association* in periodical publications, he published several pamphlets on the subject. One marked character of De Morgan was his ability to write several separate and reasonable love of books. He was a true book lover, and he was often seen in the *Mystery* and loved to turn over pages, colophons, catch-words, and the like, with curious pleasure, and he treated labi...
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unknown to him, dying on the 18th March 1871. An
interesting and truthful sketch of his life will be found
in the Monthly Notices of the Royal Astronomical Society,
for the 9th February 1872, vol. xxx. p 112, written by Mr
Ranyard, who says, "He was the kindest, as well as the
most learned of men—beneficent to every one who
approached him, never forgetting the claims which weak-
ness has on strength" (W. S. J.)

DEMOSTHENES was born in 384 B.C. His father,
who bore the same name, was an Athenian citizen belong-
ing to the deme of Paana. His mother, Cleobule, was
the daughter of Gylon, a citizen who had been active in
procuring the protection of the kings of Eosorus for the
Athenian colony of Nymphon in the Criuses, and whose
wife was a native of that region. On those grounds the
advocacy of Demosthenes, in after-days, used absurdly
to taunt him with a traitorous or barbarian ancestry.
The boy had a bitter foretaste of life. He was seven years old
when his father died, leaving property (in a manufactury
of swords, and another of upholsteries) worth about £5000,
which, invested as it seemed to have been (20 per cent was
not thought exorbitant), would have yielded rather more
than £600 a year. £600 a year was a very comfortable
income at Athens, and it was possible to live decently
on a tenth of it. Nicias, a very rich man, had property
equivalent, probably, to not more than £4000 a year.

Demosthenes was born, then, to a handsome, though not
a great fortune. But his guardians—two nephews of his
father, Aphobus and Demophon, and one Therippides—
abused their trust, and handed over to Demosthenes, when
he came of age, rather less than one-seventh of his
patrimony, perhaps between £50 and £60 a year.

Demosthenes, after studying with Isæus—then the great
master of forensic eloquence and of Attic law, especially in
will cases—brought an action against Aphobus, and gained
a verdict for about £1200. But it does not appear that he
got the money, and, after some more fruitless proceedings
against Onetor, the brother-in-law of Aphobus, the matter
was dropped,—not, however, before his relatives had
managed to throw a public burden (the equipment of a
ship of war) on their late ward, whereby their resources were
profes-

sionally

reinforced.

He now became a professional writer of speeches or
pleas for the law-courts, sometimes for the law-
courts speaking himself. Biographers have delighted to
talk how painfully Demosthenes made himself a tolerable
speaker,—how, with pebbles in his mouth, he tried his
lungs against the waves, how he declaimed as he ran up
hill, how he shot himself up in a cell, having first guarded
himself against a longing for the haunts of men by shaving
one side of his head, how he wrote out Thucydides eight
times, how he was denuded by the Assembly and encouraged
by a judicious actor who met him moping about the Perræs.
He certainly seems to have been the reverse of athletic
(the swelling Aschines upbraids him with never having been
a sportsman), and he probably had some sort of defect
in speaking his words as a boy. Perhaps the most
interesting fact about his work for the law-courts is that
he seems to have continued it, in some measure, through
the most exciting parts of his great political career. The
speech for Phormio belongs to the same year as the plea
for Megalopolis. The speech for Eosexus "Concerning the
Name" comes between the First Philippic and the First
Olynthiac. The speech against Pantaenus comes between
the speeches "On the Peace" and the Second Philippic.

1 In a notice of De Morgan's character it is impossible to omit a
reference to his witty sayings, some of which are preserved
in Dr. Saller's most interesting Diary of Henry Cole Robinson (1859),
which was reprinted in a curious and humorous account of De Morgan.
It may be added that De Morgan was a great reader and admirer
of Dickens; he was also fond of music, and a fair performer on the
flute.

2 In Jebb's Attic Orators from Antiphon to Isæus. vol. ii. p 237 f., the
traditions of the relation between Demosthenes and Isæus are
examined in detail. It is there shown that the interviews of the
men can scarcely have been either intimate or prolonged, but that
Demosthenes undoubtedly learned from Isæus the art of grappling
with a forensic adversary in direct and strenuous argument.
The political career of Demosthenes, from his first direct contact with public affairs in 355 B.C. to his death in 322, has an essential unity. It is the assertion, in successive forms adapted to successive moments, of unchanging principles. Internally, it is divided into the chapter which precedes and the chapter which follows. Chamouna. But its inner meaning, the secret of its indomitable vigour, the law which harmonizes its apparent contrasts, cannot be understood unless it is regarded as a whole. Still less can it be appreciated in all its large wisdom and sustained self-mastery if it is viewed merely as a duel between the ablest champion and the craftiest enemy of Greek freedom. The time indeed came when Demosthenes and Philip stood face to face as representative antagonists in a mortal conflict. But, for Demosthenes, the special peril represented by Philip, the peril of subjugation to Macedon, was merely a disastrous accident. Philip happened to be a man who was,tmporarily eminent and most formidable type of a danger which was already threatening Greece before his baleful star arose. As Demosthenes said to the Athenians, if the Macedonian had not existed, they would have made another Philip for themselves. Until Athens recovered something of its old spirit, there must ever be a great standing danger, not for Athens only, but for Greece, the danger that sooner or later, in some shape, from some quarter—no man could foretell the hour, the manner, or the source—thebarbarian violence would break up the glorious and undeviled tradition of separate Hellenic life.

What is the true relation of Athens to Greece? The answer which he gave to this question is the key to the life of Demosthenes. Athens, so Demosthenes held, is the natural head of Greece. Not, however, as an empress holding subject or subordinate cities in a dependence more or less compulsory. Rather as that city which most nobly expresses the noblest attributes of Greek political existence, and which, by her pre-eminent gifts both of intellect and of moral insight, is primarily responsible, everywhere and always, for the maintenance of those attributes in their integrity. Wherever the cry of the oppressed goes up from Greece against Greek, it is the voice of Athens which should first remind the oppressor that Hellene differs from barbarian in postponing the use of force to the persuasions of equal law. Wherever a barbarian hand offers wrong to any city of the Hellenic sisterhood, it is the arm of Athens which should first be stretched forth in the holy strength of Apollo the Averter. Wherever among her own children the ancient loyalty is yielding to love of pleasure or of base gain, there, above all, it is the duty of Athens to see that the central heart of Hellas is kept pure. Athens must never again seek “empire” in the sense which became odious under the influence of Cleon and Hyperbolus, when, to use the image of Aristophanes, the allies were as Babylonian slaves grinding in the Athenian mill. Athens must never permit, if she can help it, the re-establishment of that domination as Sparta exercised in Greece from the battle of Argospatomis to the battle of Leuctra. Athens must aim at leading a free confederacy, of which the members shall be bound to her by their own trust interests. Athens must seek to preserve the confidence of all Greeks alike.

Such, in the belief of Demosthenes, was the part which Athens must perform if Greece was to be safe. But reforms must be effected before Athens could be capable of such a part. The evils to be cured were different phases of one malady. Athens had long been suffering from the profound decay of public spirit. It was of the essence of a Greek commonwealth that the citizen, while perfectly free in his social life, should constantly set his duty to the city above private interests. If the state needs his services in war, he must not hire an inferior substitute to do the work.

If the state requires funds, he must not grudge the money which in quiet times might have been spent on the theatre or the banquet. He must ever remember that, in the phrase of Sophocles, the state is the ship that bears us safe. It does not profit the passenger that his cabin is comfortable if the ship is going down.

Since the early years of the Peloponnesian war, the separation of Athenian society from the state had been growing more and more marked. The old type of the eminent citizen, who was at once statesman and general, had become almost extinct. Politics were now managed by a small circle of politicians. Wars were conducted by professional soldiers whose troops were chiefly mercenaries, and who were usually regarded by the politicians either as instruments or as enemies. The mass of the citizens took no active interest in public affairs. But, though indifferent to principles, they had quickly sensitive partialities for men, and it was necessary to please them in public humour. The Peisistratid bounty from the Treasury to the poorer citizens, for the purpose of enabling them to attend the theatre at the great festivals,—in other words, for the purpose of bringing them under the concentrated influence of the best Attic culture. A provision emanating thus for the age of Pericles easily became a mischief when the once honourable name of “demagogue” began to mean a flatterer of the mob. Before the end of the Peloponnesian War the festival-money (“theoric”) was abolished. A few years after the restoration of the democracy it was again introduced. But until 354 B.C. it had never been more than a gratuity, of which the payment depended on the Treasury having a surplus. It had never been treated as an annual charge on the revenue, or guaranteed to the citizens as a dividend which they could claim by constitutional right. In 354 B.C. Eubulus became steward of the Treasury. He was an able man, with a special talent for finance, free from all taint of personal corruption, and sincerely solicitous for the honour of Athens, but enslaved to popularity, and without principles of policy. He sought to manage the citizens by humouring to the top of its bent their disaffection for personal sacrifice, and their preference for public show to public strength. More than any other one man, Eubulus represents that new, easy-going, improvident Athens in which the vigilant civic spirit was dead. His first measure was to make the festival-money a permanent item in the budget. Thenceforth this bounty was in reality very much what Demades afterwards called it,—the cement (συλλας) of the democracy.

Years before the danger from Macedon was urgent, the foremost Demosthenes had begun the work of his life,—the effort to lift the spirit of Athens, to revive the old civic loyalty, to rouse the city into taking that place and performing that part which her own welfare as well as the safety of Greece demanded. His formal public speeches must never be considered apart from his speech on public causes. The Athenian procedure against the proposer of an unconstitutional law,—i.e., of a law incompatible with existing laws—had a direct tendency to make the law-court, in such cases, a political arena. The same tendency was indirectly exerted by the tolerance of Athenian juries (in the absence of a presiding expert like a judge) for irrelevant matter, since it was usually easy for a speaker to make capital out of the adversary’s political antecedents. But the forensic speeches of Demosthenes for public causes are not only political in this general sense. They are documents, as indispensable as the Olynthics or Philippics, for his own political career. Only by taking them along with the formal political speeches, and regarding the whole as one unbroken series, can we see clearly the full scope of the task which he set before him,—a task in which his long
Demosthenes was one of the most prominent orators and statesmen of ancient Greece. His orations, which were composed to argue against various threats to Athenian power, reveal his principles of policy and his commitment to the survival and greatness of his city. Demosthenes' orations were not just rhetorical devices but practical tools designed to influence public opinion and to encourage action against perceived dangers.

In his oration against Philip of Macedon, Demosthenes wrote, "The Atheneans and Athenians and Athenians must be made to feel that they are responsible to the state. They must not be allowed to anticipate judgment on their deserts by voting each other golden crowns. They must not think to screen misappropriation of public money by getting partisans to pass new laws about state-debtors. Foreign policy must be guided by a larger and more provident conception of Athenian interests. When public excitement demands a foreign war, Athens must not rush into it without asking whether it is necessary, whether it will have Greek support, and whether she herself is ready for it. When a strong Greek city threatens a weak one, and seeks to purchase Athenian connivance with the bribe of a border-town, Athens must remember that duty and prudence alike command her to respect the independences of all Greeks. When it is proposed, by way of insurance on Athenian possessions abroad, to flatter the favourers of a doubtful ally, Athens must remember that such devices will not avail a power which has no army except on paper, and no ships fit to leave their moorings.

But the time had gone by when Athenians could have a tranquil leisure for domestic reform. A danger, calling for prompt action, had at last come very near. For six years Athens had been at war with Philip on account of his seizure of Amphipolis. Meanwhile he had destroyed Potidaea and founded Philippi. On the Thracian coast, he had become master of Abdera and Maronea. On the Thessalian coast he had acquired Methone. In a second invasion of Thessaly, he had overthrown the Phocians under Onomarchus, and had advanced to Thermopylae, to find the gates of Greece closed against him by an Athenian force. He had then moved his ships on the Propontis, and had dictated a peace to Cersobleptes. He had formed an alliance with Cardia, Perinthus, and Byzantium. Lastly, he had begun to show designs on the great Confederacy of Olynthus, the more warlike Miletus of the North. The First Philippic of Demosthenes was spoken in 351 B.C. The Third Philippic—the latest of the extant speeches—was spoken in 341 B.C. Between these he delivered eight political orations, of which seven are directly concerned with Philip. The whole series falls into two great divisions. The first division comprises those speeches which were spoken against Philip when he was still a foreign power threatening Greece from without. Such are the First Philippic and the three orations for Olynthus. The second division comprises the speeches spoken against Philip when, by admission to the Amphi­rytone Council, he had now won his way within the circle of the Greek states, and when the issue was no longer between Greece and Macedonia, but between the Greek and Macedonian parties in Greece. Such are the speech "On the Peace," the speech "On the Embassy," the speech "On the Chersonese," the Second and Third Philippics.

The First Philippic, spoken early in 351 B.C., was no 351 B.C. sudden note of alarm directing attention to an unnoted First peril. On the contrary, the Assembly was weary of the subject. For six years the war with Philip had been a theme of barren talk. Demosthenes urges that it is time to do something, and to do it with a plan. Athens fighting Philip has fared, he says, like an amateur boxer opposed to a skilled pugilist. The helpless hands have only followed blows which a trained eye should have taught them to parry. An Athenian force must be stationed on the north, at Lemnos or Thasos. Of 2000 infantry and 200 cavalry at least one quarter must be Athenian citizens capable of directing the mercenaries.

Later in the same year Demosthenes did another service in 351 B.C. to the cause of national freedom. Rhodes, seved by its "For the own act from the Athenian Confederacy, had since 355 B.C.
been virtually subject to Mausolus, prince (kouroparc) of Caria, himself a tributary of Persia. Mausolus died in 351, and was succeeded by his widow Artemisia. The democratic party in Rhodes now appealed to Athens for help in throwing off the Carian yoke. Demosthenes supported their application. No act of his life was a truer proof of statesmanship. He had once more warned Alexander that the cause of political freedom was everywhere his own, and that, wherever that cause was forsaken, there a new danger was created both for Athens and for Greece.

Next year an Athenian force under Phocion was sent to Euboea, in support of Phalarus, tyrant of Eretria, against the faction of Ciliarchus. Demosthenes protested against spending strength, needed for greater objects, on the local quarrels of a despot. Phocion won a victory at Tamynae. But the "inglorious and costly war" entailed an outlay of more than £12,000 on the ransom of captives alone, and ended in the total destruction of Athenian influence throughout Euboea. That island was now left an open field for the intrigues of Philip. Worst of all, the party of Eubulus not only defeated a proposed, arising from this campaign, for applying the festival-money to the war-fund, but actually carried a law making it high treason to renew the proposal. The amusemen of the citizens was thus officially declared to be more important than the protection of their properties or lives, and the expression of a different opinion was henceforth to be a crime.

The degree to which political enmity was exasperated by the Euboean war may be judged from the incident of Midas, an adherent of Eubulus, and a type of that opulent rowdism which shows how curiously loose the hold of the state had now become on men who were not restrained by regard for their purses or their characters. Demosthenes was choragos of his tribe, and was wearing the robe of established as a Greek power in the very centre, everywhere her own, and that, wherever that

640 B.C. 

349 B.C. 

"Against Midas."

640 B.C. 

349 B.C. 

First Olynthiacs. 

349 B.C. 

Second Olynthiacs. 

315 B.C. 

Third Olynthiacs.

political life with the advantages of a splendid gift for eloquence, a fine presence, a happy address, a ready wit, and a facile conscience. While his opponents had thus suddenly become warlike, Demosthenes had become pacific. He saw that Athens must have time to collect strength. Nothing could be gained, meanwhile, by going on with the war. Macedonian sympathizers at Athens, of which Philocrates was the chief, also favoured peace. Eleven n. c. First envoys, including Philocrates, Eschines, and Demosthenes, were sent to Philip in February, 346 n. c. After a debate at Athens, peace was concluded with Philip in April. Philip on the one hand, Athens and her allies on the other, were to keep what they respectively held at the time when the peace was ratified. But here the Athenians made a fatal error. Philip was bent on keeping the door of Greece open. Demosthenes was bent on shutting it against him. Philip was now at war with the people of Haliax in Thessaly. Thesebes had for ten years been at war with Phocis. Here were two distinct chances for Philip's armed intervention in the Peloponnesus; but if the Halians and the Phocians were included in the peace, Philip could not bear arms against them without violating the peace. Accordingly Philip insisted that they should not be included. Demosthenes insisted that they should be included. They were not included. The result followed speedily. The same envoys were sent a second time to Philip for the purpose of receiving his oaths in ratification of the peace. It was late in June before he returned from Thrace to Pella—thus gaining, under the terms, all the towns that he had taken meanwhile. He next took the envoys with him through Thessaly to Thermopylae. There—at the invitation of Thessalians and Thebans—he intervened in the Peloponnesian war. Phalarus surrendered. Phocis was crushed. Philip took its place in the Amphictyonic, and was thus established as a Greek power in the very centre, at the sacred heart, of Greece. The right of precedence in consultation of the oracle (epoynw) was transferred from Athens to Philip. While indisputably Athenians were clamouring for the revocation of the peace, Demosthenes upheld it. It ought never to have been made on such terms, he said. But, having been made, it had better be kept. "If we went to war now, where should we find allies? And after losing Oropus, Amphipolis, Cardia, Chios, Cos, Rhodes, Byzantium, shall we fight about the shadow of Delphi?"

During the eight years between the peace of Philocrates and the battle of Charonea, the authority of Demosthenes steadily grew, until it became first predominant and then paramount. He had, indeed, a melancholy advantage. Each year his argument was more and more cogently enforced by the logic of facts. In 344 he visited the Peloponnesus for the purpose of counteracting Macedonian intrigue. Mastix, he told the Peloponnesian cities, is the safeguard of free communities against tyrants. Philip lodged a formal complaint at Athens. Here, as elsewhere, the future master of Greece reminded us of Napoleon on the second Empire: it was the supreme imperturbable and persuasive oratory in protesting that he is doing one thing at the moment when his energies are concentrated on doing the opposite. Demosthenes replied in the Second Philippic. "If," he said, "Philip is the friend of Greece, he is doing wrong. If he is the enemy of Greece, we are doing right. Which is it? I hold him to be our enemy, because everything that he has hitherto done has benefited himself and hurt us." The prosecution of Eschines for malversation on the embassy, which was brought to an 343 n. c. issue in the following year, marks the moral strength of "On the place now held by Demosthenes. When the gravity of the charge and the complexity of the evidence are considered, the acquittal of Eschines by a narrow majority
must be deemed his condemnation. The speech "On the Affairs of the Chersonese," and the Third Philippic, were the crowning efforts of Demosthenes. Spoken in the same year, 341 B.C., and within a short space of each other, they must be taken together. The speech "On the Affairs of the Chersonese" regards the question, chiefly from an Athenian point of view. "If the peace means," argues Demosthenes, "that Philip can seize with impunity one Athenian possession after another, but that Athenians shall not on their peril touch that belongs to Philip, where is the line to be drawn? We shall go to war, I am told, when it is necessary If the necessity has not come yet, when will it come?" The Third Philippic surveys a wider horizon. It ascends from the Athenian to the Hellenic view. Philip has annihilated Olynthus and the Chalcidic towns. He has runned Phocis. He has frightened Thebes. He has divided Thessaly, Euboea, and the Peloponnesus are his. His power of the straits from the Adriatic to the Hellespont. Where shall be the end? Athens is the last hope of Greece. And, in this final cross, Demosthenes was the embodied energy of Athens. It was Demosthenes who went to Byzantium, brought the extranged city back to the Athenian alliance, and snatched it from the hands of Philip. It was Demosthenes who, when Philip had already seized Epeiros, hurried to Thebes, who by his impassionate appeal gained one last chance, the only possible chance, for Greek freedom, who broke down the barrier of an inveterate jealousy, who brought Thebans to fight besides Athenians, and who thus won at the eleventh hour a victory for the spirit of loyal union which took away at least one bitterness from the unspeakable calamity of Chersonese.

But the work of Demosthenes was not closed by the run of his cause. During the last sixteen years of his life he rendered services to Athens not less important, and perhaps more difficult, than those which he had rendered before. He was now, as a matter of course, foremost in the public affairs of Athens. In January 337, at the annual winter Festival of the Dead in the Outer Cerameicus, he spoke the funeral oration over those who had fallen at Chaeronea. He was member of a commission for strengthening the fortifications of the city (reconsecos). He administered the festival-fund. During a dearth which visited Athens between 330 and 326 B.C. he was charged with the organization of public relief. In 324 B.C. he was chief (archonboreos) of the sacred embassy to Olympia. Already, in 336, Ctesiphon had proposed that Demosthenes should receive a golden crown from the state, and that his extraordinary merits should be proclaimed in the theatre at the Great Dionysia. The proposal was adopted by the Senate as a bill (epofoleusamn); but it must be passed by the Assembly before it could become an act (de\v\sx). To prevent this, Eschines gave notice, in 336, that he intended to proceed against Ctesiphon for having proposed an unconstitutional measure. For six years Eschines avoided action on this notice. At last, in 330, the patriotic party felt strong enough to force him to an issue. Eschines spoke the speech "Against Ctesiphon," an attack on the whole public life of Demosthenes. Demosthenes gained an overwheming victory for himself and for the honour of Athens in the most finished, the most splendid, and the most pathetic work of ancient eloquence—the immortal oration (the Kallimachos). But the work of Demosthenes had been from the time which the house applauded. Having lost his troops and part of his treasure at Tanagra, he again presented himself at the Perae, and was now admitted. He spoke fervently of the opportunity which offered itself to those who loved the freedom of Greece. All Asia would rise with Athens to throw off the hated yoke. Fiery patriots like Hyperides were in raptures. For zeal which could be bought Harpalus had other persuasors. But Demosthenes stood firm. 'War with Alexander would, he saw, be madness. It could have but one result,—some indefinitely worse doom for Athens. Antipater and Olympias presently demanded the surrender of Harpalus. Demosthenes opposed this. But he reconciled the dignity with the loyalty of Athens by carrying a decree that Harpalus should be arrested, and that his treasure should be deposited in the Parthenon, to be held in trust for Alexander Harpalus escaped from prison. The amount of the treasure, which Harpalus had stated as 700 talents, proved to be no more than 350. Demosthenes proposed that the Areopagus should inquire what had become of the other 350 six months, spent in party intrigues, passed before the Areopagus gave in their report (apolyphos). The report implicated nine persons. Demosthenes headed the list of the accused. Hyperides was among the ten public prosecutors. Demosthenes was condemned, fined fifty talents, and, in default of payment, imprisoned. After a few days he escaped from prison to Eginia, and thence to Trozen. Two things in this obscure affair are beyond reasonable doubt. First, that Demosthenes was not bribed by Harpalus. The hatred of the Macedonian party towards Demosthenes, and the fury of those vehement patriots who cried out that he had betrayed their best opportunity, combined to procure his condemnation, with the help, probably, of some appearances which were against him. Secondly, it can hardly be questioned that, by withholding the headless patriots at this juncture, Demosthenes did heroic service to Athens.

Next year Alexander died. Then the voice of Demosthenes, calling Greece to arms, rang out like a trumpet. Early in August 328, the battle of Creoneon decided the Lamian war against Greece. Antipater demanded, as the condition on which he would refrain from besieging Athens, the surrender of the leading patriots. Demades moved the decree of the Assembly by which Demosthenes, Hyperides, and some others were condemned to death as traitors. On the 20th of Boodromion (September 16), 322, a Macedonian garrison occupied Munychia. It was a day of solemn and happy memories, a day devoted, in the celebration of the Great Mysteries, to sacred joy—the day which the glad procession of the initiated returned from Eleusis to Athens. It happened; but, however, to have another association, more significant than any trivial contrast for the present purpose of Antipater. It was the day on which, thirteen years before, Alexander had punished the rebellion of Thebes with annihilation.

The condemned men had fled to Eginia. Parting there from Hyperides and the rest, Demosthenes went on to Calauria, a small island off the coast of Argolis. In Calauria there was an ancient temple of Poseidon, once a centre of Mycenaean and Ionian worship, and surrounded with a peculiar sanctity as having been, from time immemorial, an inviolable refuge for the pursuers. Here Demosthenes sought asylum. Archias of Thuri, a man who, like Eschines, had begun life as a tragic actor, and who was now in the joy of Antipater, soon traced the fugitive, landed in Calauria, and appeared before the temple of Poseidon with a body of Thracian spearmen. Plutarch's picturesque narrative bears the marks of artistic elaboration. Demosthenes had dreamed the night before that he and Archias were competing for a prize as tragic actors; but the house applauded Demosthenes; his head was shabbily equipped, and Archias gained the prize. Archias was not the man to stick at sacrilege. In Eginia,
Hyperides and the others had been taken from the shrines of Aescus. But he hesitated to violate an asylum so peculiarly sacred as the Calaurian temple. Standing before its open door, with his Thracian soldiers around him, he endeavoured to prevail on Demosthenes to quit the holy precinct. Antipater would be certain to pardon him. Demosthenes sat silent, with his eyes fixed on the ground. At last, as the emissary persisted in his bland persuasions, he looked up and said,—"Archieus, you never moved me by your acting, and you will not move me now by your promises." Archieus lost his temper, and began to threaten. "Now," rejoined Demosthenes, "you speak like a real Macedonian oracle; before you were acting. Wait a moment, then, till I write to my friends." With these words, Demosthenes withdrew into the inner part of the temple,—still visible, however, from the entrance. He took out a roll of paper, as if he was going to write, put the pen to his mouth, and bit it, as was his habit in composing. Then he threw his head back, and drew his cloak over it. The Thracian soldiers, who were watching from the door, began to gibe at his cowardice. Archieus went in to him, encouraged him to rise, repeated his old arguments, talked to him of reconciliation with Antipater. By this time Demosthenes felt that the poison which he had sucked from the pen was beginning to work. He drew the cloak from his face, and looked steadily at Archieus. "Now you can play the part of Creon in the tragedy as soon as you like," he said, "and cast forth my body unburied. But I, O gracious Possidon, quit thy temple while I yet live! Antipater and his Macedonians have done what they could to pollute it." He moved towards the door, calling to them to support his tottering steps. He had just passed the altar of the god, when he fell, and with a groan gave up the ghost.

His death (Oct. 322 B.C.)

As a statesman, Demosthenes needs no epitaph but his own words in the speech "On the Crown." I say that, if the event had been manifest to the whole world beforehand, not even then ought Athens to have forsaken this course, if Athens had any regard for her glory, or for her past, or for the aegis to come. The Persian soldier in Herodotus, following Xerxes to foreseen ruin, confides to his fellow-guest at the banquet that the bitterest pain which man can know is σωλήν φρονείνα μηδενα πρατειν—complete, but helpless, pre-science. In the grasp of a more inexorable necessity, the champion of Greek freedom that bore onward to more tremendous catastrophe than that which strewn the waters of Salamis with Persian wrecks and the field of Platea with Persian dead; but to him, at least, it was given to proclaim aloud the clear and sure foreboding that filled his soul, to do all that true heart and free hand could do for his cause, and, though not to save, yet to encourage, to console, and to ennoble. As the inspiration of his life was larger and higher than the mere courage of resistance, so his merit must be regarded as standing altogether outside and above the struggle with Macedon. The great purpose which he set before him was to revive the political vigor, to restore the fallen prestige, and to re-establish the Panhellenic influence of Athens,—never for her own advantage merely, but always in the interest of Greece. His glory is, that while he lived he helped Athens to live a higher life. Wherever the noblest expressions of her mind are honoured, wherever the large conceptions of Pericles command the admiration of statesmen, wherever the architect and the sculptor love to dwell on the masterpieces of Ictinus and Phidias, wherever the spell of ideal beauty or of lofty contemplation is exercised by the creations of Sophocles or of Plato, there it will be remembered that the spirit which wrought in all these would have passed sooner from among men, if it had not been recalled by a trance, which others were content to mistake for the last sleep, by the passionate breath of Demosthenes.

The orator in whom artistic genius was united, more perfectly than in any other man, with moral enthusiasm oratory and with intellectual grasp, has held in the modern world the same rank which was accorded to him in the old; but he cannot enjoy the same appreciation. "Macaulay's ridicule has rescued from oblivion the criticism which pronounced the eloquence of Chatham to be more ornate than that of Demosthenes, and less diffuse than that of Cicero. Did the critic, asks Macaulay, ever hear any speaking that was less ornamented than that of Demosthenes, or more diffuse than that of Cicero? Yet the critic's remark was not so pointless as Macaulay thought it. Sincerity and intensity are, indeed, to the modern reader, the most obvious characteristics of Demosthenes. His style is, on the whole, singularly free from what we are accustomed to regard as rhetorical embellishment. Where the modern orator would employ a wealth of imagery, or elaborate a picture in exquisite detail, Demosthenes perfected oratorical style in a phrase or a word. Burke uses, in reference to Hyde Ali, the same image which Demosthenes uses in reference to Philip. "Compound all the materials of fury, havoc, desolation, into one black cloud, he hung for a while on the declivity of the mountains. Whilst the authors of all these evils were wildly and stupidly gazing on this meandering meteor, which darkened all their horizon, it suddenly burst, and poured down the whole of its contents upon the plains of the Carnatic." Demosthenes forbears to amplify. "The people gave their voice, and the danger which hung upon our borders went by like a cloud." To our modern feeling, the eloquence of Demosthenes exhibits everywhere a general stamp of earnest and simple strength. But it is well to remember the charge made against the style of Demosthenes by a contemporary Greek orator, and the defence offered by the best Greek critic of oratory. "Eaches reproached the diction of Demosthenes with excess of elaboration and adornment (παραγωγή). Dionysius, in reply, admits that Demosthenes does at times depart from simplicity,—that his style is sometimes elaborately ornate and remote from the ordinary usage. But, he adds, Demosthenes adopts this manner where it is justified by the elevation of his theme. The remark may serve to remind us of our modern disadvantage for a full appreciation of Demosthenes. The old world felt, as we do, his moral and mental greatness, his fire, his self-devotion, his insight. But it felt also, as we can never feel, the unapproachable artistry. This it was that made Demosthenes unique to the ancients. The ardent patriot, the far-seeing statesman, were united in his person with the consummate and unapproachable artist. Dionysius devoted two special treatises to Demosthenes,—one on his language and style (λατανοί κόροι), the other on his treatment of subject-matter (παραγωγῆς τότος). The latter is lost. The former is one of the best essays in literary criticism which antiquity has bequeathed to us. The idea which it works out is that Demosthenes has perfected oratory by fusing in a glorious harmony the elements which had hitherto belonged to separate types. The austere dignity of Antiphon, the plain elegance of Lysias, the smooth and balanced finish of that middle or normal character which is represented by Isocrates, have come together in Demosthenes. Nor is this all. In each species he excels the specialists. He surpasses the school of Antiphon in perspicacity, the school of Lysias in nerve, the school of Isocrates in variety, in felicity, in symmetry, in pathos, in power. Demosthenes has at command all the discursive brilliancy which fascinates a festive audience. He has that power of conciseness and lucid narration which is required by the forensic speaker. His political eloquence can worthy
image the majesty of the state, and enforce weighty counsel with lofty and impassioned fervour. A true artist, he grudged no labour which could make the least part of his work more perfect. Lecrates spent ten years on the Poroi. After Plato's death, a manuscript was found among his papers with the first eight words of the Republic arranged in several different orders. What wonder, then, asks the Greek critic, if the diligence of Demosthenes was no less incessant and minute? "To me," he says, "it seems far more natural that a man engaged in composing political discourses, impervious to prudence, impervious to memory which they were bound to guard, and has left no more resonant warnings rise above the quiet murmur of their art, than ears that are too quick for an inevitable struggle, and, when soothing critical study of his text is not yet sixty years old. To this day popular books occasionally show traces of the notion that everything which the manuscripts ascribe to him was written by him. But modern study has long since learned to recognize the surest traits of his style, not, indeed, with the exquisite perception of his old Greek critics, yet sufficiently, as a rule, for the discrimination of genuine work from false, and on a firmer diplomatic basis. The modern world can never catch again the finer tones of that grand music as they still echoed on the ear of Greece in her calm after-time—

but men can still hear the voice of a prophet whose resonant warnings rise above confused sounds of strife, they can still feel the energy, the anguish, the indignation which vibrate through his accents; and they can acknowledge, with an admiration undiminished by the lapse of twenty centuries, the power of his words to quench the sense of honour in craven hearts, to raise the votaries of selfish luxury to the loyalty of prolonged self-sacrifice, to nerve irresistible arms for an inevitable struggle, and, when all has been lost, to sustain the vanquished with the thought that, though a power above man has forbidden them to prevail, yet their suffering has saved the lustre of a memory in which they were bound to guard, and has left them pure before the gods.

More than half of the sixty-one speeches extant under the name of Demosthenes are certainly or probably spurious. Much difference of opinion still exists in particular cases, especially as regards two or three of the orations. As the results to which the preponderance of opinion now leans are given in the following table. Those marked a were already rejected or doubted in antiquity, those marked b, first in modern times:

### I. DELIBERATIVE SPEECHES.

#### GENUINE

- Or. 7 On Halonnesus (by Hec Diplomata)  
- Or. 20 On Phoebus  
- Or. 24 On Timotheus  
- Or. 23 On Aristocrates  
- Or. 21 On Mithridus  
- Or. 19 On the Embassy  
- Or. 18 On the Crown

## SPEECHES

- Or. 55 On Theocrates  
- Or. 25, 26, 47 On Aristogiton 1 and 2 (Rhetorical forgeries)

### II. FORENSIC SPEECHES.

#### A. In Public Causes.

- Or. 22 On (k)ones Androthem  
- Or. 30, 31 On the Slaves  
- Or. 41 On Spenias  
- Or. 55 On Callicles  
- Or. 54 On Conon  
- Or. 36 On Thucydides  
- Or. 39 On the Bystons of Demosthenes  
- Or. 37 On the Antipoleus  
- Or. 38 On the Naumachia of Demosthenes

#### B. In Private Causes.

- Or. 27 On Aphylus  
- Or. 30 On the Contra Orestes  
- Or. 41 On the Contra Sphocles  
- Or. 47 On the Ephorus  
- Or. 65 On the Bisphamon  
- Or. 59 On the Nearean

#### SPEECHES

- Or. 51 On the Triarchic Crown (by Clearchus)  
- Or. 49 On the Contra Macartus  
- Or. 44 On the Contra Lycarches  
- Or. 35 On the Contra Lycarches  
- Or. 42 On the Contra Thespianum  
- Or. 47 On the Contra Lycarches  
- Or. 40 On the Contra Bystons of Demosthenes  
- Or. 57 On the Contra Eubulus  
- Or. 33 On the Contra Atpolus  
- Or. 58 On the Contra Hecatia  

#### SERICUS

- Or. 14 On the Navy Beaks  
- Or. 16 On the People of Magnesia  
- Or. 4 On the First Philippic  
- Or. 15 On the Rhodians  
- Or. 1 First Olynthus  
- Or. 2 Second Olynthus  
- Or. 3 Third Olynthus  
- Or. 5 On the People  
- Or. 6 Second Philippic  
- Or. 8 On the Affairs of the Chersonese  
- Or. 9 Third Philippic

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The ancient fame of Demosthenes as an orator can be compared only with the fame of Homer as a poet. Cicero, with generous appreciation, recognizes Demosthenes as the standard of perfection. Dionysius, the closest and most penetrating of his ancient critics, exhausts the language of admiration in showing how Demosthenes united and elevated whatever had been best in earlier masters of the Greek idiom. Hermogenes, in his works on rhetoric, refers to Demosthenes, as the basis of the art. The writer of the treatise On Sublimity knows no heights loftier than those to which Demosthenes has risen. From his own younger contemporaries, Aristotle and Theophrastus, who founded their theory of rhetoric in large part on his...
practice, down to the latest Byzantines, the consent of
theorists, orators, antiquarians, anthologists, lexicographers,
offered the same unvarying homage to Demosthenes. His
work was used commentators such as Xenon, Minucian,
Basilius, Elius Theon, Zeomus of Gaza. Arguments to
his speeches were drawn up by rhetoricians so distin-
guished as Numamus and Libanius. Accomplished men
of letters, such as Julius Vestinus and Elius Dionysius,
selected from his writings choice passages for declamation
or perusal, of which fragments are incorporated in the
miscel-
any of Photius and the lexicon of Harpocration, Polliux,
and Sidas. It might have been anticipated that the purity of
a text so widely read and so renowned would, from the
earliest times, have been guarded with jealous care. The
works of the three great dramatists had been thus
protected, about 340 n.c., by a standard Attic recension.
But no such good fortune befell the works of Demosthenes.
Alexandrian criticism was chiefly occupied with poetry.
The titular works of Demosthenes were, indeed, registered,
with those of an acknowledged catalogue of the Septuagint
of Alexandria and Pergamum. But no thorough
attempt was made to separate the authentic works from
those spurious works which had even then become mingled
with them. Philosophical schools which, like the Stone,
felt the ethical interest of Demosthenes, cared little for his
language. The rhetoricians who imitated or analyzed his
style cared little for the criticism of his text. Their treat-
ment of it had, indeed, a direct tendency to falsify it. It
was customary to indicate by marks those passages which
were especially useful for study or imitation. It then
became a rhetorical exercise to recast, adapt, or interweave
such passages. Supposer, the commentator on Herme
wrote on the subject of the εισαγωγήν τῶν Δαμοσθηναίων,
"adaptations or transcripts of passages in Demosthenes.
" Such manipulation could not but lead to interpolations or
confusions in the original text. Great, too, as was the
attention bestowed on the thought, sentiment, and style of
Demosthenes, comparatively little care was bestowed on his
subject-matter. He was studied more on the moral and
the formal side than on the real side. An incorrect sub-
stitution of one name for another, a reading which, gave
an impossible date, insertions of spurious laws or dates,
were points which few readers would stop to notice. Hence
it resulted that, while Plato, Thucydides, and Demosthenes
were the most popular of the classical prose-
writers, the text of Demosthenes, the most widely used
passages of, was also the least pure. His more careful
students at length made an effort to arrest the process of
corruption. Editions of Demosthenes based on a critical
recension, and called "Ἀριστοκράτης (Ἀριστοκράτης),
" came to be distinguished from the popular, or Συγγαλήτρια, edition of Demosthenes—upwards of 170 in number—one is far superior, as a whole, to the
corrugated text. This is Παρισίανος Σ 2394, of the 10th century. A
comparison of this MS. with the extracts of Elius, Aratides, and
Harpocration from the Third Philipince favours the view that
it represents the εἰσαγωγήν τῶν Δαμοσθηναίων, used by Hermogenes and by the rhetoricians generally,
have been the chief sources of our other manuscripts. The
collation of this manuscript by Immanuel Bekker first placed
the textual criticism of Demosthenes on a sound footing.
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tions, but it is the sole voucher for many excellent readings.
tion when serious illness required that he should leave Rome for change of climate. By way of Switzerland, he travelled to the Netherlands, and made a short stay at Tournay, to which he returned to teach humanity after a period of study at the university of Douai, where he distinguished himself in poetical and philosophical competitions, and took the degree of M.A. As his prospects in Tournay were discouraging, he went back to Paris, graduated as doctor of canon law, and became a regent in the college of Navarre, while yet, as he himself states, in his seventeenth year. Destined to be a wanderer through life, he soon quitted Paris to settle in Toulouse, where his stay was shortened by certain influential individuals, whose resentment he had excited by his advocacy of university rights. At Nimes, his next resting-place, he was, by twenty-three of the twenty-four judges, condemed, having been assailed, and against whom the Parliament of Toulouse decided, Dempster made a journey into Spain, whence, after a brief engagement as preceptor to a son of the famous Saint-Luc, he departed for his native land. As he did not experience a favourable reception either from his relatives or from the clergy, he remained but a short time, and again betook himself to Paris There he spent seven years with advantage to his reputation and purse, as regent in different colleges. His connection with that of Beauvais, over which he presided for some time, was brought to a close by a high-handed procedure illustrative of his fierce courage, and suggestive of his fitness for other than literary contests. In the year 1610 he accepted the invitation of King James to come to London, and was honoured and rewarded by that sovereign. But disappointment and unmerited censure, his clerical and episcopal prejudices influenced the king to withhold, he again left England for Italy. On his arrival in Rome he was at first suspected of being a spy, but when his claims were ascertained, he was so fortunate as to receive letters of recommendation from the Pope and other influential personages to the duke of Tuscany, which issued in his appointment to the professorship of the Pandects in the university of Pisa. Writings of this date attest his competency for the chair. After his inaugural lecture his reputation and emoluments increased. In the following year, on a visit to England, his disputations sprang him into collision with an English ecclesiastic, whose representation of the quarrel led the grand duke to negative his judgment, to a patriotic vanity which led to absurd exaggerations on Scotch subjects, and to the disturbing influence of a restless life. For list of his very numerous writings see Irving's Lives of the Scottish Writers.

DEMURRAGE, in the law of merchant shipping, is the sum payable by the freighter to the shipowner for detention of the vessel in port beyond the number of days allowed for the purpose of loading or unloading. The contract between the parties generally specifies the amount per day to be paid as demurrage, and the number of days for which the ship may be detained at that rate. If it should be detained longer than the specified time of demurrage, the freighter will be entitled to damages, the measure of which will (in general, but not necessarily) be the sum agreed upon between the parties for demurrage. If no time is specified for unloading a ship, the “usual customatory time” will be implied. But when there is positive contract that the goods are to be taken out a fixed delay beyond that time, not caused by the act of the shipowner himself, will make the freighter liable for demurrage, whether the delay be caused by him or not. So an agreement to load, not mentioning time, according to the customary manner, as an agreement to load within a reasonable time according to the usage of the port, and any delay beyond that time, though caused by circumstances beyond the control of the freighters, will make them liable. In calculating the number of lay-days (i.e., the days allowed for loading, &c., and not chargeable with demurrage), Sundays will be taken into account, unless, as otherwise specified or there is a custom to the contrary. The contract to pay demurrage in a charter-party is between the freighters and the shipowner, but if demurrage is mentioned in the bill of lading, the consignee will be held to take the goods under an implied obligation to pay the demurrage, and the master may sue for it in his own name. See Charter-Party.

DEMURRE, in English law, is an objection taken to the sufficiency, in point of law, of the pleading or written statement of the other side. In equity pleading a demurrer lay only against the bill, and not against the answer, at common law any part of the pleading could be demurred to. And now in all cases any party may demur to any pleading of the opposite party, or to any part of a pleading setting up a distinct cause of action, ground of defence, set off, counter-claim, reply, or as the case may be, on the ground that the facts alleged therein do not show any cause of action or ground of defence, &c. (Judicature Act, 1875—Rules of Court, Order 28).

DENAIN, a town of France, in the department of Nord, and arrondissement of Valenciennes, 14 miles to the east of Douai, on the Scheldt Canal and the railway between Arras and Soisson. A mere village in the beginning of the present century, it has rapidly increased since 1848, and now, according to the census of 1872, which was unusually engaged in coal mines, iron-smelting works, sugar factories, and distilleries. The village was the scene of the decisive victory gained, in
DENIGH, a maritza county of North Wales, is about 40 miles in its extreme length from N.W. to S.E., by 36 at its greatest and 8 at its least width, where it is divided into two unequal portions. It embraces a superficial area of 322,000 statute acres, or 621 square miles. The population in 1871 amounted to 105,102 persons, 92,866 males and 52,236 females; in 1861 it numbered 100,778, and in 1851, 92,583. The county was formed 27 Hen. VIII., out of the lordships of Denbigh, Ruthin, Rhos, and Blyfonior, corresponding roughly with the district called Perfeddwyd (or the midland between the Conway and the Clwyd), and the lordships of Bromfield, Yale, and Chirkland, which at an earlier period had been comprised in the possessions of Gruffydd ap Madoc, the lord of Dinas Bran. It is bounded on the W. in its northern division by the River Conway, from one of its ancient mouths in Llandrillo Bay to its source in the Migneollen mountains, in the southern by the Berwyn chain, and on its extreme E. by the line of the Dee, the Ceiriog, and a portion of Offa's Dyke. The intervening surface is very irregular, and its physical character highly diversified. The N.W. portion is occupied by the bleak, bare table-land of the Hiraethog hills, which slope on the west to the valley of the Conway and on the east to the Vale of Clwyd, by which they are divided from the Clwydian range and the hills of Yale. On the N. it stretches along the bays of Colwyn and Abergele, and on the S. it is separated from Merionethshire by the Yappty and Llangwm range. From this watershed flow tributaries of the Clwyd, the Conway, and the Dee — viz., the Elwy, the Aled, the Clywedog, the Merddwir, and the Alwen. The valleys along which some of these streams flow are, from their fertility and natural beauty, in striking contrast to their bleak surroundings. Among these may be specified the beautiful gorge of the Elwy and the broad fertile plain of the Vale of Clwyd. Of the other division, which extends from near Farndon Bridge in the N.E. to the Rhaidda in Mochnant S.W., that portion which lies between the Rhunabon hills and the Dee is extremely rich in minerals as well as in agricultural produce; the other portion, from the Berwyn to Offa's Dyke, is comparatively wild and barren, save the pretty valley of the Tanat, the cup-like plant of Llanlunl, and the lower reaches of the Ceiriog. One of the feeders of the Tanat rolls down a waterfall named Pistyll Rhaidd, which is 240 feet high; and another rises in the little lake of "Llynceus," which nestles beneath Moel Sych, 2716 feet, the highest point in the Berwyn range, and indeed in the county. There are also a few lakes in the Hiraethog district, the largest of which — Aled and Alwen — give rise to rivers of the same name.

Soil and Agriculture.—On the uplands the soil is too cold and poor, and the seasons too uncommercial, to admit of corn crops; but a more profitable investment is made in the rearing of mountain ponies and of sheep and black cattle, which are sold in great numbers to be fattened in the Midlands Counties of England, for the London market. Less than a third of the surface is under cultivation; and the agricultural acreage was thus distributed in the years 1873 and 1876:

<table>
<thead>
<tr>
<th>Year</th>
<th>Corn Crops</th>
<th>Green Crops</th>
<th>Gross</th>
</tr>
</thead>
<tbody>
<tr>
<td>1873</td>
<td>86,448</td>
<td>15,463</td>
<td>101,909</td>
</tr>
<tr>
<td>1876</td>
<td>61,416</td>
<td>14,324</td>
<td>75,739</td>
</tr>
</tbody>
</table>

Of the corn crops, oats occupy much the largest amount of acreage, and of green crops, turnips.

The live stock of the county in the same years was distributed thus:

<table>
<thead>
<tr>
<th>Year</th>
<th>Cattle</th>
<th>Sheep</th>
<th>Pigs</th>
<th>Horses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1873</td>
<td>28,122</td>
<td>273,721</td>
<td>24,240</td>
<td>11,985</td>
</tr>
<tr>
<td>1876</td>
<td>35,975</td>
<td>255,464</td>
<td>24,433</td>
<td>10,789</td>
</tr>
</tbody>
</table>

In the valleys, and indeed far up the sunny slopes of the hills, the latest improvements in agriculture may be observed, and the reaping hook and the thrashing machines. This progress has been largely due to several Farmers' Clubs, such as the Denbighshire and Flintshire, the Vale of Conway, and the Conwy Druid. But the railways have done still more. The Vale of Llanrwst, the Vale of Clwyd, and the Denbigh and Chester lines have linked their respective districts to the great trunk line of the London and North Western; whilst the Denbigh, Ruthin, and Corwen, the Corwen and Rhunabon, the Wrexham and Connah's Quay, and yet again the Rhosllanerchrugog and the Glyn Ceiriog tramways, have done the same for the Great Western,—thus opening all the main arteries of the county alike to external and internal communication, and vastly developing its resources. Down the picturesque Vale of Llangollen also runs the great Holyhead Road,—in its day the principal means of communication between London and Ireland, and for engineering skill, excellence of workmanship, and beauty of scenery probably still unsurpassed in the United Kingdom.

The geology of the county is full of interest, as it develops all the principal strata that intervene between the Lower Silurian and the Triassic series. In the Lower Silurian district, which extends from the southern boundary to the Ceiriog, the Llandeilo formation of the eastern slope of the Berwyn and the Bala beds of shelly sandstone are traversed east and west by bands of intrusive felspathic porphyry and ashes; northwards from the Ceiriog to the limestone fringe at Llandrillo, the Wenlock shale of the Upper Silurian covers the entire mass of the Hiraethog and Clwydian hills, but verging on its western slopes into the Denbighshire grnt, which may be traced southward in a continuous line from the mouth of the Conway as far as Llanddew Ewern, and in Radnorshire. On its eastern slope a narrow broken band of the Old Red crops up along the Vale of Clwyd and in Eglwysian. Resting upon the Carboniferous Limestone extends from Llanymynech, its extreme southern point, to the Cynonbrain fault, and there forks into two divisions that terminate respectively in the Great Orme's Head and in Talargoch, and are separated from each other by the denuded shales of the Moel Famma range. In the Vale of Clwyd the limestone underlies the New Red Sandstone, and in the eastern division it is itself overlaid by the millstone grit of Rhunabon and Minera, and by a long reach of the coal measures which near Wrexham are 4½ miles in breadth. Eastward of these a broad strip of the Permian succeeds, and yet again between this and the Dee the ground is occupied—as in the Vale of Clwyd—by the New Red.

The mineral resources of the county under these conditions are naturally considerable. Paving flags are raised at Nantglyn; slates and slabs for ornamental purposes, on a large scale, on Khewfelen, near Llangollen; and slates at Glyn Ceiriog. The limestone is used largely, and exported extensively for building, fluxing, and agricultural purposes; and at Brymbo there is a fine layer of China stone. The sandstones of Cefn Rhunabon are wrought into grindstones, and the grit is used for millstones. The coal measures at Chirk, Rhunabon, and Brymbo are very productive, the number of collieries in 1875 being 61, and the coal annually estimated at 1,373,560 tons. In close contiguity to the coal seams, ironstone is found; and the six furnaces in
blast at Rhuabon and at Brymbo (where John Wilkinson was the first to introduce the industry) produced (together with one in Flintshire) in the same year 55,099 tons of pig iron, valued at £235,000. Lead ore is another and as an important team, the smelting of lead ore has been the Great Mine lead and gold mines, which yields profits of about £30,000 a year. The seven mines in the county produced, in 1875, 2600 tons of lead ore, 1954 tons of lead, and 10,673 ounces of silver. One of the later industries introduced has been the manufacture of dynamite in the valley of the Currog. At the village of Llanfaircuddefaid, and at Llangollen, there are woolen factories.

The principal towns are Wrexham (population 5876), the centre of the mining district, noted for its beautiful church tower, and recently selected as the county town, and for its castle ruins and Howell's female orphan school; Ruthin (3298), where the assizes are held, famous for its grammar school and its fine castle lately rebuilt, Llangollen, with its beautiful scenery, Llanrwst, with its church monuments and roofed lofts, its bridge, and salmon fishing, and Holt, with its ancient ruined castle.

As regards the ownership of the land, the county (in 1873) was divided among 5708 separate proprietors, whose total rental was estimated at £450,421. Of the owners 3150, or 60 per cent., held less than 1 acre, the same proportion as in the neighbouring county of Flint, while the average of small proprietors in all England was 71 per cent. The average property amounted to 61 acres, while that of all England was 54, and the average value per acre was £1, 8s. 3d., as against £3, 6s. 2d. for all England.

The following proprietors hold more than 5000 acres in the above year—viz, Sir Watkin Wynn, 33,998 acres; J. L. Wyne, Cowd Coch, 10,197; Lord Bagot, Pool Park, 9385; H. R. Hughes, Kinnel, 8561; C. W. Finch, Pentrefoelas, 8025; B. W. Wynn, Gathewain, 6435, C. S. Mainwaring, Galtithaen, 6493, R. M. Bidulph, Clwrl Castle, 5513; W. C. West, Ruthin Castle, 5457, and Hugh Williams, Bodelwyddan, 3360.

For civil purposes, the county is divided into 6 hundreds, 9 petty sessional divisions, 5 police districts, 5 highway districts, and 9 lieutenantcy subdivisions; and it forms a part of the North Wales circuit, with a westerly assize. For parliamentary purposes the county is an undivided constituency, returning two representatives to Parliament, while the contributory boroughs of Denbigh, Ruthin, Wrexham, and Holt return one member each. Ecclesiastically the county lies entirely within the diocese of St Asaph, the number of parishes and ecclesiastical districts is 61, comprised under 6 deaneries within the archdeaconry of St Asaph. In educational matters, the Latin or second-grade schools comprise the endowed grammar schools of Holt, founded in 1611; Denbigh, in 1726; Wrexham, in 1603; Rhuabon, by Vicar Robuston, in 1703, and Llanrwst, by Sir John Wynne of Gwydlr, in 1610. The Greek, or highest grade, is supplied by that of Ruthin, founded in 1574 by Dr Gabriel Goodman, dean of Westminster, and native of the town and the re-founder of its Christ's Hospital. This school has been the nursery of many eminent Welshmen.

Antiquities. Of prehistoric remains, the coves in the limestone escarpments of Cefn, that overhang the valley of the Elwy, yield a noteworthy supply. They contain remains of the hypocaustum, elephant, rhinoceros, horn, hyena, bear, reindeer, &c. The glutton was found in a neighbouring cave of Plas Heaton, felidone implements are found in the adjoining Bont Newydd cave, and a polished stone-axe of a similar one at Rhosddig, all in the same range. Near Cefn, too, was discovered in 1869, on the opening of a curried in Tydwy Bleiddya, a chambered tomb containing skeletons, which, on comparison with a similar type found at Pertha Chwarae, gave rise to the title of the "Flatynce Men of Denbighshire."

In the early years of the 20th century, the same year, 1885, a writer in the Archæologia Cambrensis, p. 270, has given a summary of the antiquities of the county, most of which may be put down as British or at least Celtic traces of the Romans exist at Clawdd Coch (Medolanum I), Pen-y-caer, Bwlch, Penmorfa, and their roads passed from Deva (Chester) to Segontium (Carnarvon) and to Mons Henri (Tonna-y-Mur) respectively. To the Romano-British period belong the inscribed stones at Gwythern and Pentrefroelas. The Pillar of "Ellesg," near Vale Crucis, tells of Brochmial and the struggle against the invading Northumbrians under Ethelfrith, oth A.D., whilst the Dyke of "Oxol" hands down the memory of the Mercian advance. Adjusting this last, and running side by side with it, is the similar but shorter earthwork called "Watt's Dyke," of debateable origin and purpose.

Of the earliest castles the ruins of "Dinas Bran" still crown the conical hill that overhangs Llangollen. Denbigh, which has been compared to Stirling for site and beauty—built in the time of Edward I and destroyed in the civil wars—overlooks the Vale of Clwyd, Holt, on the banks of the Dee, probably the Caerlegllo of Beda, shared the same fate. Overhewn at the same time, has been twice rebuilt within this century. Chirk alone has weathered the storms of time and war, and is still occupied as a family residence.

Among the early ecclesiastical buildings and remains we may name the Caerleon abbey of Vale Crucis and the Carmelite chapel at Denbigh, both now in decay, the clusters at Ruthin, and the old house of Brynyfynnon, sometimes called the nunnery at Wrexham, the collegiate churches of Wrexham and Ruthin, the beautiful roof-lofts and screens of Llanrwst, Gresford, and Denwen, the porport bruses and monuments in the Gwydir Chapel, Llanrwst, and at Whitchurch, Denbigh, the churchyard cross at Derwen, and the stained glass at Gresford and Llanhardfyn in Dyffryn Clwyd.

The principal gentlemen's seats of Tudor date comprise Gwydir (Lady Williams of Daresbury), Brynkmill (Lord A. E. H. Trevor-Trefyfan), Trefynwy (Lord Bagot), Llwynyn (Colonel Heygarth), Cadrgwn (inc decay). Those of later erection include Llangedwyn and Wynnstay (Sir W. Williams Wynne, Bart.), Kinnel (H. R. Hughes), Pool Park (Lord Bagot), Heswall (Colonel Wynne Finch), Llanerch Whithall Dod, Gwydir Castle (R. B. Hesketh), Plas Power (T. Fitchough), Llandyssilio Hall (C. F. Bery), Acton Park (Sir R. R. Cunliffe, Bart.), Gallifaenus (T. Mainwaring), Enwast (J. J. Floukes), Glanywern (P. S. Humpherson), Gelglynn (J. Carstairs Jones).

Among the books bearing upon the history of the county are the following—"The Archæologia Cambrensis," or Journal of the Cambrian Archæological Association; "Penmaen's Tour in Wales," Lewis Topographical Dictionary, Thomas, History of the Diocese of St Asaph; Annals of Counties and County Families of Wales, by Dr. Nicholas, York's Royal Tribes of Wales, Memoirs of the Gwydir Family, by Sir John Wynne, Memoirs of the Goodmans, by E. Newsome, Account of Denbigh and of Salop, by the same; "Ancient and Modern Denbigh," by John Williams, Records of the Lessorship of Denbigh, by the same; "Handbook of the Vale of Clwyd," by Denwen, Wrexham and its Neighborhood, by Jones. The village churches of the county have been well illustrated by Lloyd Williams and Underwood, architects, of Denbigh.
The story of Denderah, in Coptic Tenty, a or Tentyra, used to be regarded as equivalent to Thyr-Athor, “the abode of Athor”; but, according to an hypothesis started by Brugsch, and since proved by the investigations of Dümichen, it is now explained as “the Land of the Hippopotamus” (Taa-ta-re), in allusion to the use of this animal as a symbol of the goddess Isis, who is regularly identified with Athor in the Denderah inscriptions. The sacred name was An, and a list is still extant of 136 substitutes or genethlia omnia, such as the house of enlightened souls, the house of gladness, the house of the waking and laughing of the sun-god Ra. Though, as readily indicated, the present temples of Denderah belong to the latest period of Egyptian art, the original occupation was for sacred buildings dates from the earliest times. Belonging to inscriptions, such as the house of enlightened souls, the house of gladness, the house of the waking and laughing of the sun-god Ra. Though, as readily indicated, the present temples of Denderah belong to the latest period of Egyptian art.

Of the cohors, who spent three months in personal exploration of acreage, anion, a restoration of the temple was effected by Thothmes III. of the 18th dynasty, in keeping with an ancient plan belonging to the reign of Chufu, which had been found, in the time of Theops, “in the interior of a wall of the Southern House.”

The people of Tentyra were remarkable for their hospitality to the crocodile and its worshippers; and in their attacks on the reptile they displayed so much audacity and skill that the Romans in the time of Strabo brought a number of them over to Italy as a new attraction for the amphitheatre. In modern times the name of Denderah has become especially famous on account of the two designs known respectively as the circular and the quadrangular zodiac, which have been the subject of the most elaborate discussion among Egyptologists. The former was discovered by General Dessau about the end of last century, and at length in 1820 removed by M. Leloron to Paris, where it was purchased by the Government for 150,000 francs, and deposited in the Bibliothèque Impériale; the latter, first observed by M. Dupuis, a member of the French commission, is still in its original position, as, instead of occupying a comparatively small and portable disk, it forms, as already indicated, the decoration of two corresponding halves. Copies of both the zodiacs have frequently been made, and are easily accessible in F. C. Lauth’s Les Zodiacs de Denderah, Munich, 1865, a memoir in which he maintains that both designs are commemorative calendars of the Greco-Roman period.

See also Wilkinson’s Ancient Egyptians; Leprince, Observations sur l’emploi des représentations solaires de l’Antiquité; Paris, 1824; Halma, Études et explications des Zodiacs Egyptiens, 1822; Leprince’s Zeichnungen für Ägyptische Sprache und Alterthumskunde, Paris, 1866, a town of Belgium, in the province of East Flanders, about 18 miles east of Ghent, so called from its situation at the mouth of the Dender, a right-hand affluent of the Scheldt. It is the seat of a court of primary instance, has a hospital, a lunatic asylum, two orphanages, an academy of architecture and design, a public library, and a picture gallery, and carries on the manufacture of woolsens, linens, ropes, paper, tobacco, and various other branches of industry. In the old church of Notre Dame, which was raised to collegiate rank in 1106, there are two paintings by Vandyck—a Crucifixion and an Adoration of the Shepherds. Till 1264, when it passed into the possession of Robert Bethune, count of Flanders, Dendermonde was governed in direct dependence on the empire. Its name frequently occurs in the history of the various wars in the Low Countries, the most memorable occasion being in 1607, when it defended itself against Louis XIV. by laying the neighbourhood under water; in 1706, when it was besieged and captured by General Churchill; and in 1745, when it was taken by the French. The fortifications were dismantled by Joseph II. in 1784; but they were restored in 1822. The bridge over the Scheldt dates from 1825. Population in 1866, 8300.

DENHAM, Sir John (1615–1668), a royalist poet, who has won a place among the foremost British authors more by a happy accident than by any decided genius, was the only son of Sir John Denham, lord chief baron of the Exchequer, in Ireland, and was born in Dublin in 1615. In 1617 his father was promoted to the rank of baron of the Exchequer in England, and removed to London with his family. The future poet attended a grammar school in London, and in Michaelmas term 1631 was removed to Oxford, where he entered a gentle’s college and published Tempestus. Having taken his degree of B.A., he began the study of the law at Lincoln’s Inn in 1634; but the character he had
maintained at Oxford, of being “a slow, dreaming young man,” gave way to a scandalous reputation for gambling, by which he beggared himself and seriously embarrassed his father. We learn that, by way of penance, he wrote aware, nor in the rebellIOn, threescore thousand strong, when no one was began

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Denham's poems have not been edited

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Poem.s and TranslaltOus.

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It is kno\n
the patron samt of France, flourished in the middle of the 3d century. What is known of his life rests chiefly on the not altogether trustworthy authority of Gregory of Tours, according to which he was the leader of a band of seven missionaries who came from Rome to Gaul, and founded churches in seven cities. Deens settled in Paris, where he made many converts, and became the first Christian bishop. In 272, during the persecution of Valerian, he was beheaded along with some of his companions. Another account places the date of the martyrdom between 286 and 290. The well-known legend, according to which St Denis after his decapitation walked two miles with his head in his hands, probably originated in a mistaken interpretation of pictures intended to indicate the manner of his death. It was not unusual to represent a martyr by decapitation bearing his head in his hands as an offering, and there are effigies of St Denis with the notched head in its natural position and the head in the hands as well. The bodies of the three martyrs were thrown into the River Semo, but were afterwards recovered and honourably buried by a Christian lady named Catala, not far from the place where they suffered. Over the tomb a chapel was built, which in the 9th century was replaced by a church. The famous abbey of St Denis was founded on the same spot by Dagobert in the 7th century. A later legend of the French church, following the tradition of the Greek Church, identified St Denis of Paris with the notched head in its natural position and the head in the hands as well. One of the greatest charges brought against Abelard was the fact that he denied this identity on the authority of a passage in Bede. St Denis was gradually adopted as the patron saint of the French people, St Louis being the patron saint of the royal family. His festival is celebrated on the 9th October.

DENIZEN, an alien who obtains by letters patent (ex donatione regis) certain of the privileges of a British subject. He cannot be a member of the Privy Council or of Parliament, or hold any civil or military office of trust. The Naturalisation Act, 1870, provides that nothing therein contained shall affect the grant of any letters of denization by Her Majesty. See Naturalization.

DENMAN, THOMAS, FIRST ETON (1779–1854), one of the most distinguished of the chief-justices of England, was born at London, the son of a well-known physician, 23d July 1779. He received the rudiments of his educa-
tution at Palgrave School, near Diss, in Norfolk, at that time conducted by Mrs Barbauld. At ten years of age he was sent to Eton, and he afterwards was entered at St John's College, Cambridge, where he graduated in 1800. He took only an ordinary degree, having a positive distaste for mathematics. Soon after leaving Cambridge he married; and in 1806 he was called to the bar at Lincoln's Inn, and at once took upon practice. His success was rapid, and in a few years he attained a position at the bar second only to that of Brougham and Scarlett. He distinguished himself by his eloquent defence of the Luddites and in the important privilege case of Stockdale conducted by Lord Denman, being only 550 feet above the sea. Denmark, however, is nowhere low in the sense in which Holland is; the country is pleasantly diversified, and rises a little at the coast even though it remains flat inland. The landscape of the islands and the south-eastern part of Jutland is rich in beech-woods, corn-fields, and meadows, and even the minute inlets are green and fertile. In the western and northern districts of Jutland this gives place to a wide expanse of moorland, covered with heather, and ending at the sea in low, whitish-grey cliffs. There is a melancholy charm even about these monotonous tracts, and it cannot be said that Denmark is wanting in natural beauty, though of a quiet order. It is obvious that in such a country there can exist no rivers. The Gudenaa, the longest of the Danish streams, is little more than a brook. Nor are there any large lakes. Pieces of water of considerable size, however, are numerous; of these the largest are the Arresø and the Eromose in Zealand, and the chain of lakes of various names near Silkeborg in Jutland. Many of these mires, overhung with thick beech-woods, are extremely beautiful.

The climate presents no remarkable features. The country lies at the division between Eastern and Western Europe, and partakes of the characteristics of both. Its climate differs from that of Scotland (which is in the same latitude) less in the nature of the seasons than in the rapidity of their transitions. The following are the mean annual temperature (Fahr.):—

<table>
<thead>
<tr>
<th>Season</th>
<th>Copenhagen</th>
<th>Frederikshavn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winter</td>
<td>33° 9</td>
<td>32°</td>
</tr>
<tr>
<td>Spring</td>
<td>43° 7</td>
<td>43° 90</td>
</tr>
<tr>
<td>Summer</td>
<td>63° 05</td>
<td>63° 05</td>
</tr>
<tr>
<td>Autumn</td>
<td>49° 1</td>
<td>48° 65</td>
</tr>
<tr>
<td>Whole year</td>
<td>47° 18</td>
<td>46° 00</td>
</tr>
</tbody>
</table>

Snow falls on an average on thirty days in the year, and westerly winds are more prevalent than easterly in the ratio of 10 to 10. Storms of wind and rain are exceedingly frequent, particularly in July and August. In the district of Aalborg, in the north of Jutland, a cold and dry N.W. wind called "shot" prevails in May and June, and is exceedingly destructive to vegetation; while along the west coast of the peninsula similar effects are produced by a salt mist, which carries its influence from 15 to 30 miles inland.

The fauna of Denmark presents no peculiarity. The wild animals and birds are those of the rest of Central Europe. The larger quadrupeds are all extinct; an extinct red deer—which was formerly so abundant that in a single hunt in Jutland in August 1803 no less than 1600 head of deer were killed—is now only to be met with in preserves. In the kjøkken-moddings and elsewhere, however, are found vestiges which prove that the urochs, the wild boar, the beaver and the wolf have all existed since the arrival of man. The usual domestic animals are abundantly found in the Denmark of to-day, with the exception of the goat, which is very uncommon.

In her flora, Denmark presents greater variety than would have been anticipated from so low and monotonous a country. The ordinary forms of the north of Europe grow with great luxuriance in the mild air and protected soil of the islands and the eastern coast; while on the heaths and along the sandhills on the Atlantic side there flourish a great variety of unusual species.

The Danish forest is almost exclusively made up of beech, a tree which thrives better in Denmark than in any other country of Europe. The oak and sable are now rare, though in ancient times both took a prominent place in clothing the Danish islands. The almost universal predominance of the beech dates from about two centuries ago. In the reign of Christian IV, the oak was still the characteristic Danish tree. No conifer grows in Denmark, except under careful
In Bornholm, it should be mentioned, the flora is more like that of Sweden; not the beech, but the pine, birch, and ash are the most abundant trees. 

**Agriculture.** — Denmark is pre-eminently a corn land, and the cereals grown are all the usual European varieties, in the light and sandy soils buckwheat takes the place of rye, wheat, barley, and oats. The potato is largely cultivated, as well as peas, clover, vetches, and turnips. The usual North European fruit-trees and even pears and apricots ripen well in sheltered places. The nectarine, however, is not known as a hardy fruit. The produce of grass is not very large, the fertility of the ground tempting the farmers to use it all for grain. In relation to its size there is no country in Europe, except Belgium and England, that can compete with Denmark as a corn-producer. According to the official returns of 1871, there were in that year 11,571,710 acres under some sort of crop, fallow, or in grass; or about 65 per cent. of the total area of the country; 5,694,495 acres more were in woods and forests. The following table will show the distribution of the crops, in English statute acres:

<table>
<thead>
<tr>
<th>Crop</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>1,258,650</td>
</tr>
<tr>
<td>Barley</td>
<td>689,794</td>
</tr>
<tr>
<td>Oats</td>
<td>584,435</td>
</tr>
<tr>
<td>Rye</td>
<td>701,607</td>
</tr>
<tr>
<td>Beans and peas</td>
<td>80,566</td>
</tr>
<tr>
<td>Buckwheat</td>
<td>45,180</td>
</tr>
<tr>
<td>Mixed corn</td>
<td>1,528,606</td>
</tr>
<tr>
<td>Potatoes</td>
<td>97,817</td>
</tr>
</tbody>
</table>

Of the actual production of the above crops no estimate has been furnished by the Statistical Bureau. The land in Denmark is minutely subdivided, owing partly to the state statute of inclosure, and partly to the adoption of the scheme of large dairy farms.

The large estates of the nobles are generally in the hands of the peasantry, who maintain an hereditary attachment to their ancestral farms. Below these are the small peasant estates (generally capable of supporting from 10 to 15 cows); there is also a class of cotters, freeholders called *musters*, with land sufficient to keep one or two cows. The most remarkable feature in the Danish husbandry is, that greater value is attached to the produce of the dairy than to that of the soil, and that much of the horse power is withdrawn from the fields and employed in the work of the dairy. Independently of the stock maintained in the large dairy farms, this branch of industry has given rise to a distinct class of men, hiring cows by the year. Notwithstanding the great extent of pasture, the country produces more grain than is required for its own consumption.

The mineral products of Denmark are too unimportant to require enumeration. It is one of the poorest countries of Europe in this particular. It is rich, however, in clays, while it should be stated that in the island of Bornholm there are quarries of freestone and marble. There is but little coal yet discovered in the country.

**Manufactures.** — The most notable Danish manufacture is the fabrication of porcelain. The nucleus of this important industry was a factory started in 1772, by F. H. Muller, for the making of china out of Bornholm clay. In 1779 it passed into the hands of the state, and has remained there ever since. Originally the Copenhagen potters imitated the Dresden china made at Meissen, but they are now famous for very graceful designs of their own invention, and the porcelain has a distinct character of its own. The inventions of Thomsen and others have been very largely repeated and imitated in this charming ware. Besides the royal works, there are private factories employing a large number of men. Terra cotta and faience are also manufactured in Copenhagen. The iron-works of Denmark have made very considerable progress since the separation of Norway, and they are largely supplied with raw material imported from England. There are many iron foundries around Copenhagen, and in that city there are small manufactures of locomotives, and of machinery of various kinds.

The woollen, linen, and cotton manufactures of Denmark are for the most part domestic, and carried on purely for local consumption. Linen is the principal article of domestic industry in Zealand. The woollen manufacture occupies about 2000 men. The sugar refineries, of which the largest are at Copenhagen, prepare most of the sugar required for domestic consumption. Cherry brandy is also manufactured in that city, and largely exported. The making of paper and distillation are carried on at different parts of the country to some extent.

**Commerce.** — Formerly the commercial legislation of Denmark was so much of a drawback that all manufactures had to be delivered to the customs, where they were sold by public auction, the proceeds of which were used to support the public works.

Of no less importance were the regulations made from time to time concerning the Sound toll, a question which in the 17th century led to many hostilities between Denmark, Sweden, and Holland. Having formerly possessed both sides of the entrance to the Baltic, the Danish Crown looked upon the Sound as exclusively her own, refusing to admit any foreign vessels without payment of a certain duty, and this right was never successfully contested by the other powers. An exception, however, was made in favour of Sweden, and of late the toll has been entirely abolished.

The principal ports of Denmark are Copenhagen, Helsingor, Korose, Raahus, Aalborg, and Frederikshavn. The total value of the goods imported into Denmark in 1874 was £12,859,000, and of the goods exported, £9,574,000.

The following tables show the quantities of the principal articles imported and exported in the same year. We give them in the original figures, presuming that a ton of coal equals 3-8 imperial bushels, and a pound of coal 4 6775 bushels, and a pound of avoirdupois. 

### Imports

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chincory</td>
<td>3,561,354</td>
<td>23,588,775</td>
</tr>
<tr>
<td>Coals</td>
<td>3,610,055</td>
<td>23,588,775</td>
</tr>
<tr>
<td>Coffee</td>
<td>22,274</td>
<td>23,588,775</td>
</tr>
<tr>
<td>Corn</td>
<td>3,561,354</td>
<td>23,588,775</td>
</tr>
<tr>
<td>Rye</td>
<td>218,537</td>
<td>23,588,775</td>
</tr>
<tr>
<td>Wheat</td>
<td>134,141</td>
<td>23,588,775</td>
</tr>
<tr>
<td>Glass wares</td>
<td>4,605,333</td>
<td>23,588,775</td>
</tr>
<tr>
<td>Hides and skins, raw</td>
<td>5,537,858</td>
<td>23,588,775</td>
</tr>
<tr>
<td>Cotton manufactures</td>
<td>11,468,192</td>
<td>23,588,775</td>
</tr>
<tr>
<td>Woolen</td>
<td>3,072,834</td>
<td>23,588,775</td>
</tr>
<tr>
<td>Metals, iron wrought and unwrought</td>
<td>9,583,941</td>
<td>23,588,775</td>
</tr>
<tr>
<td>Oil, of all kinds</td>
<td>15,112,611</td>
<td>23,588,775</td>
</tr>
<tr>
<td>Rice</td>
<td>1,009,787</td>
<td>23,588,775</td>
</tr>
<tr>
<td>Salt</td>
<td>40,877,999</td>
<td>23,588,775</td>
</tr>
<tr>
<td>Sugar</td>
<td>64,838,793</td>
<td>23,588,775</td>
</tr>
<tr>
<td>Tea</td>
<td>772,396</td>
<td>23,588,775</td>
</tr>
<tr>
<td>Tobacco</td>
<td>5,955,629</td>
<td>23,588,775</td>
</tr>
</tbody>
</table>

**Exports**

<table>
<thead>
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<th>Value</th>
</tr>
</thead>
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<tr>
<td>Tobacco</td>
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<td>23,588,775</td>
</tr>
</tbody>
</table>

**VIII**
The absolute power which had overbearing conduct of the king. This singular change of the perpetual uncertainties of monarchy, the king sharing his power with a diet of two members, 12 of whom were nominated for 8 years—7 by the city of Copenhagen, 45 by the port of Fredenkshavn, 361,840 tonden.

The court found it thus a matter of indifference to free institutions as a resentment of the principle of limited monarchy, the king sharing his power with a diet of two houses, both of which are elective. The first, called Folksthmg, has the privilege of discussing the budget and other public questions; while the other is confined to the local affairs of the provinces. The liberty of religion and of the press, and the inviolability of person and property, were amply guaranteed by the new constitution. This great charter received a further revision on the 28th of July 1866, according to which the second chamber, called the Landsthmg, consists of 66 members, 12 of whom are nominated for life by the king, and the others elected for 8 years—7 by the city of Copenhagen, 45 by the electoral districts of the towns and country, 1 by Bornholm, and 1 by the Faroe Islands. The Folksthmg is composed of one representative for every 15,000 inhabitants, elected for three years. In 1875 it contained 102 members. The privy council consists of the king, the crown prince, and the ministers.

The staff of the army was composed at the same time, of 25 commissioned and 37 non-commissioned officers. The navy of Denmark comprised, at the commencement of September 1875, 6 iron-clads, 12 unarmed vessels, 7 gun-boats, and 5 paddle steamers,—the whole carrying a total of 285 guns. The navy is recruited by conscription from the coast population. It was manned in September 1875 by 911 men, and officered by 1 admiral, 15 commanders, and 81 captains and lieutenants. In March 1875 the mercantile fleet of Denmark comprised 2846 vessels, of an aggregate burden of 212,600 tons.

Religion and Education.—The established religion of Denmark is the Lutheran, which was introduced as early as 1536, the church revenue being at that time seized and retained by the Crown. In no country of Europe was the Reformation introduced in a more bloodless and easy way than in Denmark. During the earliest Christian times the whole of Denmark was under the jurisdiction of the archbishop of Hamburg. King Erik Eiegod, after a personal visit to the Pope, contrived to place his kingdom under a Scandinavian prelate and his own subject, the archbishop of Lund in Skania, which then belonging to the Danish dominions. After the cession of Skania to Sweden, Rosckilde became the metropolis see. At present (1877) there are six bishops, besides the metropolitan, viz., the bishops of Funen, of Lolland and Falster, of Aarhus, of

**EXPENDITURE.**

<table>
<thead>
<tr>
<th>Category</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civil list</td>
<td>1,000,000</td>
</tr>
<tr>
<td>Royal sparsage</td>
<td>442,544</td>
</tr>
<tr>
<td>Privy Council</td>
<td>94,616</td>
</tr>
<tr>
<td>Rupert</td>
<td>290,000</td>
</tr>
<tr>
<td>National debt</td>
<td>12,596,732</td>
</tr>
<tr>
<td>Civil pensions</td>
<td>2,728,259</td>
</tr>
<tr>
<td>Military pensions</td>
<td>694,560</td>
</tr>
<tr>
<td>Foreign affairs</td>
<td>383,612</td>
</tr>
<tr>
<td>Religion, education, &amp;c</td>
<td>932,698</td>
</tr>
<tr>
<td>Legal</td>
<td>2,906,414</td>
</tr>
<tr>
<td>Home department</td>
<td>1,598,256</td>
</tr>
<tr>
<td>War</td>
<td>5,954,247</td>
</tr>
<tr>
<td>Marine</td>
<td>4,774,992</td>
</tr>
<tr>
<td>Finance</td>
<td>2,906,007</td>
</tr>
<tr>
<td>Administration of Ireland</td>
<td>106,700</td>
</tr>
<tr>
<td>Extraordinary expenses</td>
<td>3,718,560</td>
</tr>
<tr>
<td>Public works</td>
<td></td>
</tr>
<tr>
<td>Subventions, &amp;c</td>
<td>760,728</td>
</tr>
</tbody>
</table>

The national debt amounted in 1875 to 100,805,339 kr. (£5,600,330).

**FINANCE.**

<table>
<thead>
<tr>
<th>Category</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>109,200,000</td>
</tr>
<tr>
<td>Expenditure</td>
<td>88,600,000</td>
</tr>
<tr>
<td>Surplus</td>
<td>20,600,000</td>
</tr>
<tr>
<td>Net balance</td>
<td>20,600,000</td>
</tr>
</tbody>
</table>

The fortifications of Copenhagen have been entirely razed, but the city is still protected by some forts in the Sound. The castle of Kronborg, near Helsingor, interesting to Englishmen as the scene of Hamlet, is in good preservation, and well manned. The port of Frederikshavn, on the extreme north of Jutland, is also strongly fortified.

**STATISTICS.**

<table>
<thead>
<tr>
<th>Category</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>3,718,560</td>
</tr>
<tr>
<td>Revenue</td>
<td>1,092,000</td>
</tr>
<tr>
<td>Expenditure</td>
<td>886,000</td>
</tr>
<tr>
<td>Net balance</td>
<td>206,000</td>
</tr>
</tbody>
</table>
Aslborg, of Viborg, and of Eibe. They have no political function by reason of their office, although they may, and often do, take a prominent part in politics. Dissent is comparatively unknown, or at least it has not yet become a serious danger to the national church. The Mormon agitation for a considerable time made a special raid upon the Danish peasantry, but the emigration to Great Salt Lake City is now but small. Roman Catholics were until lately hardly existent in Scandinavia, where their presence was not tolerated. The following statistics will show the proportion of religious bodies at the census of 1870.—Lutherans, 1,770,000, Jews, 4300; Baptists, 3200; Mormons, 2200; Roman Catholics, 1800; Irvingites, 350. Complete toleration is now enjoyed in Denmark.

The educational institutions of Denmark have reached a very high degree of perfection, indeed few countries, if any, can compete with Denmark in this respect. Most of the peculiar advantages in the Danish system seem to arise from this, that all schools, both grammar and other, have been put in a state of dependence on the university of Copenhagen, and under its control, while the university itself is particularly well managed. All educational institutions of the country are now managed by a royal college, consisting of three or four assessors and a president, called the royal commission for the university and grammar schools. This commission has no superior but the king, and reports to him directly. It appoints all professors in the university of Copenhagen, all rectors, co-rectors, and other teachers of grammar schools, and also promotes these functionaries from lower to higher grades. Education is compulsory. Poor parishes pay a nominal sum weekly for the education of their children at the Government schools, so that almost all the lower class can read and write. Confirmation is also compulsory, and till that rite has been received, the youth of both sexes are in stato papulari. Certificates of baptism, confirmation, and vaccination are indispensable before entering on service, apprenticeship, or matrimony.

Territorial divisions.—These consist of provinces, amts, and parishes. The provinces are seven, and correspond to the provinces of England. The provinces are seven, and correspond to the provinces of England. The provinces of Jutland, Zealand, and Lolland and Falster, comprising those two islands, and Funen, which also includes Langeland, Ero, and Tasinge. Four provinces are on the mainland:—Aarhus, occupying the south-east of Jutland; Aalborg, the north, Viborg, the north-east, and Eibe, the south west of the same. Each of these provinces is divided into several amts, answering very much to the English hundreds.

The only large city in Denmark is Copenhagen in Zealand, which was estimated in February 1876 to have a population of 190,000, and, with its suburbs, of 233,000. Thirteen other towns contain 5000 inhabitants and upwards—vis., Odense (Funen), 17,000; Aarhus (Jutland), 15,000; Randers and Aalborg (Jutland), 12,000 each; Horsens (Jutland), 11,000; Helsingør (Zealand), 9000; Fredericia (Jutland), 7000; Viborg (Jutland), 6000; Svenborg (Funen), and Yde (Jutland), 6000 each; Ronne (Bornholm), Slesvig (Zealand), Kolding (Jutland), and Roskilde (Zealand), 5000 each.

Communication both by land and water is well provided for in Denmark. A railway from the Schleswig frontier proceeds to Fredericia, from whence one branch passes to the extreme north of Jutland, another crosses the island of Funen from Middelfart to Nyborg. This is the direct route from Germany to Copenhagen. From Nyborg a packet crosses the Great Belt to Konge, and thence another line runs through Zealand to Copenhagen. There is also a south Zealand line from Roskilde to Vordingborg, which is continued through the island of Falster, besides a short line in Lolland. The only canal is the Thyborøn, a short canal which connects the Laim Fjord (the arm of the sea which penetrates so far into the north of Jutland) with the German Ocean. This is a natural canal, formed after the Aeger channel (a passage opened by the storm of the 31st of February 1826) had become choked with sand. The canal can only be used by vessels of very small burden.

Dependences.—The colonial possessions of Denmark are the Faroe Islands, Iceland, Greenland, and the Danish West Indies. The Faroe Islands are an archipelago nearly midway between Shetland and Iceland. They are considered as an outlying amt of the mother-country rather than as a colony. Seventeen of these islands are inhabited, the largest is Shafa, on the eastern shore of which is built the capital Thorshavn. The islands are governed by an antiquated and representative form of Government. Iceland is a large island at the north-western extremity of the map of Europe, just outside the Arctic Circle. Until lately it was considered as a colony of Denmark, and was subject to a tyrannous exercise of the laws of the mother country on the part of small officials. At the visit of Christian IX, however, in 1874, it received a constitution and an independent administration, which came into force in August of that year.

The possessions of Denmark in the West Indies consist of three islands lying to the east of Porto Rico. Of these St. Croix is the largest, and St. John the smallest, while the chief town and the residence of the governor are on St. Thomas. A few years ago the last named island was offered to and very nearly purchased by the United States, but the proceedings fell through.

The whole peninsula or continent of Greenland is nominally in the possession of Denmark; but in point of fact her dominion there is limited to a few scattered trading stations along the western coast. It is divided into two provinces, north and south. Of these, the former contains, according to a census of 1874, 4095 native inhabitants, and the other 5512. The whole European population was only 235, the inhabitants of the entire colony thus numbering 9813.

Population.—There was a census of Denmark taken in 1870, according to which the population of the mother country was 1,784,741, of the Faroe Islands 9922, and of the other dependencies 117,409. On the 1st of February 1876 the following official estimate was made:

<table>
<thead>
<tr>
<th>Provinces</th>
<th>Area in English square miles</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zealand and Moen</td>
<td>2793</td>
<td>692,400</td>
</tr>
<tr>
<td>Bornholm</td>
<td>271</td>
<td>33,500</td>
</tr>
<tr>
<td>Lolland and Falster</td>
<td>640</td>
<td>69,100</td>
</tr>
<tr>
<td>Funen, Langeland, &amp;c.</td>
<td>1,092</td>
<td>248,090</td>
</tr>
<tr>
<td>Jutland</td>
<td>816,540</td>
<td></td>
</tr>
<tr>
<td>Faroe Islands</td>
<td>14,573</td>
<td>1,902,900</td>
</tr>
<tr>
<td>Iceland</td>
<td>80,000</td>
<td>71,300</td>
</tr>
<tr>
<td>Greenland</td>
<td>9,800</td>
<td></td>
</tr>
<tr>
<td>West Indies</td>
<td>St. Croix</td>
<td>60</td>
</tr>
<tr>
<td>St. Thomas</td>
<td>14</td>
<td>14,060</td>
</tr>
<tr>
<td>St. John</td>
<td>13</td>
<td>1,000</td>
</tr>
<tr>
<td>Total</td>
<td>45,135</td>
<td>2,032,200</td>
</tr>
</tbody>
</table>

Denmark proper has 130 inhabitants to the English square mile. The density of population is much greater on the islands than in Jutland, Zealand having nearly 250 inhabitants to the square mile. The increase in the population of the towns has of late years been very rapid, and has much exceeded that of the country districts. Of the provincial towns, the most prosperous is Aarhus, which, from being comparatively insignificant, has become the most important place in Jutland. The only exception to this rapid increase is in the case of the towns on the new German frontier, especially Fredericia and Eibe.
Emigration, which at one time was carried on to a considerable extent, has in recent years greatly diminished. Of the 20,884 persons who left Denmark in 1875, 1678 emigrated to the United States of America, 359 to Australia, 47 to Canada, and 54 to other parts of America, including the Salt Lake City.

The Danes are a yellow-haired and blue-eyed Teutonic race of middling stature, and still bearing traces of their kinship with the Northern Scandinavian peoples. Their habits of life resemble those of the North Germans even more than those of their friendly neighbours the Swedes. The independent tenure of the land by a vast number of small farmers, bonder, who are their own masters, gives an air of carelessness, almost of truculence, to the well-to-do Danish peasant. He is thoroughly well satisfied with himself, takes an eager interest in current politics, and is generally a fairly-educated man of extreme democratic principles. The gaiety of the Danes is surprising; they have nothing of the stolidity of the Germans, or the severity of the English.

The name Danir, or Danes, proceeded is undecided, and has mences the authentic history of the Danes. The gods of ancient Danish mythology were connected with the Sarmatic Invasion (the floodmg of the north) which was supposed to have come from the Far East early in the Christian era. The first general history of the Danes is that of Thulo, by which he is believed to have meant Jutland. At this time the inhabitants of Southern Scandinavia are supposed to have been Celts, and it was long after this that what Raak defined as the Sarmatic Invasion (the flooding of the north of Europe by emigrants from Asia) began to take place. The Danes, as they were called, came through Russia into Germany and Denmark, and passed on into Sweden across the Sound. It was used to be supposed that they pushed before them the races of the Lapps and Finns, but the latest discoveries of archaeology tend to prove that these latter came from Siberia over the north of the Gulf of Bothnia, and met the Goths a little outside the Arctic Circle.

The gods anciently worshipped in Denmark were the Eóir, a family of heroic deities in which the characteristics of the gods of ancient Greece were, in Denmark, the heroes of the gods of ancient Greece. The name was the original, or very early, called the Donok language, or Danish tongue, which gave way in the 13th and 14th centuries, when the Danish supremacy was on the decline, to Nornen Mif, or Norse speech. From the earliest historical accounts we possess it appears that Jutland was divided among a great number of petty chiefdoms, often at war with one another. These sma-konger, or "little kings," as they were called, were, however, to some degree banded together, and entirely distinct from the eastern Danes of the islands. These also were ruled by a variety of chiefs, but they all recognized the supremacy of the king of Léjre, a city in Zealand somewhere near the present town of Roskilde. Western Denmark was known to the Northmen as Red Gothland, and consisted of all the mainland north of the Elbe, that is, Holstein, Schleswig, and Jutland. Island Gothland consisted of the islands, and of the provinces of Skaania and Bleking, that is, all the south of Sweden. During the rule of the Valdemar kings, the old chronicle, Sæxo Grammaticus, recorded in Latin an immense number of mythical and semi-mythical stories concerning the old history of Denmark, and his chronicle is a treasure-house of truth and falsehood. According to him, the country takes its name from a king Dan the Father, who united the emigrants from Asia by emigrants from Asia, and who was succeeded by a king Frode, with whom a golden age set in. The question of supremacy among the Scandinavian peoples was settled in favour of Sweden at the battle of Bravalla, which was fought, as is supposed, in the 8th century between Sven, king of Sweden, and Harald Hildetan, king of Denmark; with this battle the purey mythic age closes. In 823 the gospel was first preached in Denmark by some Frankish monks sent by the emperor Louis le Debonaire. Little was done in the way of actual conversion, but the road was opened for future missionaries. The famous Ansgarius failed to impress the Danes, though he was consoled by his brilliant success among the Swedes. The Christians, however, began by degrees to be tolerated. The first king of all Denmark was Gorm the Old, who flourished between 860 and 935. He was the son of a king of Lejre, and by great administrative ability and strategic skill established his hereditary dominions not only all that is now included in Denmark, but Schleswig, Holstein, Skaania, and even some provinces in Norway. And besides gaining all this territory, he also pushed his conquests for a while as far as Smolenisk and Kieft in Russia, Ansgarius and Núpsing in Germany, and as Sens in France, after besieging Paris.

At the period in question, or rather somewhat later, namely, about the early part of the 10th century, commences the authentic history of the country. As early as the 8th century the Danes were remarkable for their well-planned predatory expeditions by sea, as was proved by their repeated invasions of England, their occasional descents on Scotland, and their conquest of Normandy. To cross a sea of three or four hundred miles in breadth was a bold undertaking for men unacquainted with the use of the compass; but the number of islands in Denmark early accustomed the inhabitants to navigation, and gave them a practical dexterity in it.

The early establishment of the Danes in England, and the subsequent arrival of bodies of their countrymen, joined to the talents of two of their princes, Sweyn, or Svend, and Canute, enabled the latter to acquire the crown of England. Canute (or Kau) the Great completed the conquest begun by his father, and became king of England as well as of Denmark in the year 1013; he resided generally in the former country, and left the crown to his sons Harald and Harthaknud. On the death of the latter, without male heirs, the Danish dynasty in England came to a close in 1042.

The feudal system was introduced in the 12th century, which, as well as the 13th, was marked in Denmark by contentions between the sovereign and the barons. About the 13th century the population of the towns in Denmark, as in Germany, though still very small, became so great as to entitle them to obtain from the Crown charters of incorporation, and an exemption from the control of the barons, in which we was vested almost entire property of the land. A regular constitution began now to be formed in Denmark, and the towns sent deputies or representatives to the States, or Parliament, which, it was enacted, should meet once a year. It was also ordered that the laws should be uniform throughout the kingdom, and that no tax should be imposed without the authority of Parliament.

It is unnecessary to recapitulate the successive sovereigns of Denmark in the Middle Ages, of whom few were of distinguished ability. The names of most frequent occurrence among them in those early times were Kau, Valdemar, and Erik. Those of Christern, or Christian, and Frederik were of later date. One of the most remarkable of the sovereigns in the Middle Ages was Valdemar II., who sus-
In 1202, who was the most prosperous and afterwards the most unfortunate of Danish kings. He conquered Holstein and Pomerania, and in 1217 the emperor recognized his authority over a large part of the north of Germany, all in fact north of the Elbe. Valdemar then pushed his forces into Norway and Sweden, but without success; but in 1219 he set out on a vast crusade against the Pagans in Esthonia, the only of which he overran, forcibly converting the inhabitants. It was in this war that Denmark commenced to use the Dannebrog, or national standard, a white cross on a blood-red field. On his return, in the midst of his magnificent success, a great calamity befell Valdemar, he was treacherously captured at Lyo in 1233 by the duke of Schwerin, and imprisoned for several years in a dungeon in Mecklenburg, but he finally escaped, and ruled until his death in 1241.

The chief mercantile intercourse of Denmark in those times was with Lubeck and the north-west of Germany. To the Baltic Lubeck was nearly what Venice was to the Mediterranean, the earliest commercial town of consequence. There was also some traffic from Denmark to the mouths of the Vistula,—the name of Danzig, or Danzic (Danish town or port), indicating that a Danish colony, aware of the advantages of the situation, had established itself there.

During the same period (the 14th century), the association of the Hanse Towns had acquired considerable strength, and asserted tremendously the freedom of commerce in the north of Europe. Denmark, commanding the entrance into the Baltic, was the power most interested in laying merchant vessels under a toll or regular contribution; and the result was repeated contests, followed at times by open war, between the Danish Government and this powerful confederacy.

The most important event, however, in the history of Denmark, or indeed of Scandinavia, in the Middle Ages, was the conjunct submission of Sweden, Denmark, and Norway to one sovereign, by the compact or union of Calmar, in the year 1397. Valdemar III, king of Denmark, having died in the year 1373, left two daughters, of whom the second, Margaret, was married to Hakon VI, king of Norway. On the demise of her husband the government of Norway remained in her hands, and afterwards, on the death of her son, who had been declared king of Denmark, the States, or Parliament, of that country fixed this princess on the throne, on her consenting to extend and secure their rights and privileges. The States of Norway, finding herself seated on the thrones of Denmark and Norway, directed her attention to that of Sweden, the succession to which would have fallen to her husband Hakon had he survived. The Swedes were divided into two parties—that of Margaret, and that of a duke of Mecklenburg. An appeal to arms took place, and the result was favourable to the cause of the queen, her competitor being defeated and made prisoner. In 1397 the States of the three kingdoms were convoked at Calmar, a town situated in the south of Sweden. There they concurred in passing the Act known as the Union of Calmar, by which the three kingdoms were henceforth to be under one sovereign, who should, however, be bound to govern each according to its respective laws and customs. To guard against their separation, it was enacted that, if a sovereign should leave several sons, one of them only should be the ruler of the three kingdoms, and in the event of the reigning king or queen dying without children, the senators and parliamentary deputies of the three kingdoms should jointly proceed to the election of another joint sovereign.

Such were the precautions taken by Margaret, who has been called the Semiramis of the North, in order to banish war and political dissensions from Scandinavia. For a time they were successful, and peace and concord were maintained during the lifetime of the queen and her two successors. But the union, as regarded the Swedes, was far from being cordial, they submitted reluctantly to a foreign family, and considered themselves as obliged to act in subjection to the political views of Denmark. At last the severity, or rather the cruelty, of one of the Danish kings, Christian II, and the appearance of an able assertor of Swedish independence in Gustavus Vasa, led to an insurrection, which, beginning in the northern province of Dalecarlia, extended throughout Sweden, and led to a definitive separation of the two crowns in the year 1523.

In 1490 the reigning king of Denmark made a commercial treaty with Henry VII. of England, by which the English engaged to pay the Sound dues on all vessels entering or returning from the Baltic, and in return they were allowed to have mercantile consuls in the chief seaports of Denmark and Norway. By this time the extension of trade had given rise in Denmark, as in England, to a middle class, among whom the sovereign found in each country the means of balancing the political weight of the nobility, hence a grant was made by the kings of Denmark of various privileges to traders, and of relief from a number of local imposts on the transit of merchandise.

The rude habits of the Danes were strongly affected by the difficulty which the Danish Government found in putting a stop to the practice of plundering merchantmen shipwrecked on the coast. The practice was to collect in the vicinity of a wreck such a number of the inhabitants as to prevent the master or masterman from opposing the seizure of the merchandise. Even bishops residing on the coast, though humane in their treatment of the crews, did not scruple to aid in taking forcible possession of the cargo; and it is a remarkable fact, that a law passed by the king, about the year 1521, for the prevention of those practices, was abrogated and publicly burned at the instance of the barons and clergy a few years after, when a new sovereign had succeeded to the crown.

The doctrines of the Reformation found their way into Denmark at an early date. Frederick I., who began to reign in 1529, and had formerly been duke of Holstein, in that year embraced the Protestant religion. The inhabitants of Denmark being divided between the Catholics and Protestants, Frederick began by an edict for tolerating both religions. An assembly of the States, or Parliament, next passed a solemn Act for the free preaching of the Protestant faith, and for allowing ecclesiastics, of any class to marry and reside in any part of the kingdom. The consequence of this was a reduction of the number of the inmates of abbeys, monasteries, and convents, along with the general diffusion of the Lutheran faith throughout the kingdom. This rapid progress enabled the succeeding sovereign, Christian III., to act like Henry VIII. of England, by annexing the church-lands to the Crown, and strengthening the power of the sovereign at the expense of that of the clergy.

The great religious war which broke out in 1518 for the first time fixed the attention of Europe on Denmark. The victories of the imperial general Tilly, and of Maximilian of Bavaria, over the Protestants, appeared to make the Emperor Ferdinand, who was the head of the Catholic party, complete master of Germany, when Christian IV. of Denmark, encouraged by England and France, determined to take up the Protestant cause as a principal in the general contest. But being weakly supported by his allies, the Danish king, after one year's campaign, was obliged to flee before the victorious army of Valenstein (1629). To prevent peace, which was concluded at Lubeck in 1629. By the stipulations of that peace Denmark bound itself never
to interfere in the affairs of Germany, and was besides compelled to acknowledge Wallenstein as duke of Mecklenburg. This peace would have been still more humiliating for Denmark, if France, already influenced by the counsels of Richelieu, had not interposed its efforts on behalf of the vanquished. The emperor now thought of nothing less than the entire subjection of Germany to his will. A new adversary, however, arose in Gustavus Adolphus the king of Sweden. The short and glorious career of this king will be found described in its proper place. But this much must be here observed, that despite the fall of Adolphus in the battle of Lützen in 1632, the power of Sweden was becoming continually more considerable, and consequently an object of real envy to all its neighbours, but especially to Denmark. Thus it happened that besides the general religious war, repeated hostilities were being carried on between Sweden and Denmark separately.

The first contest lasted from 1637 to 1645, and the treaty concluded the latter year proved rather a truce than a peace. The Danish Government formed an alliance with Holland, and added that republic in its sanguinary contest in 1652 with England, then under the authority of Cromwell. The king of Sweden at that time was Charles Gustavus, a prince in the vigour of life, and actuated by all the ambition and enterprise of Vasa, who had carried his military operations into Poland, which then, as at other times, seemed to invite the presence of foreigners by its internal discontents. But on learning the hostile disposition of the Danish Government, Charles withdrew his troops from Poland, entered Holstein, and overran the whole province. As soon as the winter had advanced, and it had become practicable to cross on the ice the arms of the sea separating the Danish islands from the mainland, the Swedish army traversed in that manner the Little Belt, took Odense, the capital of the island of Funen, and even invested Copenhagen. That capital was not without a military force, but its walls were weak, nor was it adequately supplied with provisions or military stores. On this occasion the Danes, with their king Frederick III., at their head, displayed great firmness, and resisted the efforts of the Swedes, until, under the mediation of the English envoy at the court of Copenhagen, hostilities were suspended, and a treaty signed. This treaty, however, was only partly carried into execution. Dissatisfied at the delay which took place, Charles Gustavus made a second attempt on Copenhagen in the autumn of 1658; but he found it impracticable to prevent the introduction of supplies into the city by sea, as the Dutch now came to the assistance of their Danish allies. Still the Swedes persisted in the siege, and in the depth of winter (in February 1659) made an attempt to take Copenhagen by storm. The attacks were made on three points; each was headed by an able commander, but all were unsuccessful, and the siege was necessarily converted into a blockade. Soon afterwards the king of Sweden died, and the sanguinary contest was brought to a close by the treaty of Copenhagen in 1660. This peace ceded to the Swedish Crown Skåna, Aland, several places on the island of Rugen, and a free passage through the Sound.

In the following year, 1660, the vicissitudes of war were succeeded by a remarkable revolution in domestic politics. The reigning king of Denmark, Frederick IV., was tempted by the youth of Charles XI. of Sweden to invade the dominions of his ally the duke of Holstein. Frederick was little aware of the spirit of his opponent, who became afterwards so well known in the wars of the north of Europe. Charles, determined to strike at once at his enemy's capital, lost no time in crossing the narrow sea between Sweden and Denmark, and in investing the city of Copenhagen. The inhabitants in alarm appealed to the humanity of the young monarch; and the result was the speedy conclusion of peace, with the payment of a sum of money to the Swedes. Taught by this lesson, the Danish Government remained neutral in the following years, when the course of events led Charles to the aid of Saxony, where for some time success attended his arms. After the defeat of Charles at the battle of
Pultowa, in the year 1709, and his subsequent flight into Turkey, the king of Denmark eagerly embraced the opportunity of renewing hostilities with Sweden, and invaded both Holstein in the south and the province of Skania to the north. Skania was badly provided with troops, but it had officers trained in one of the best military schools of the age, and a peasantry full of national antipathy to the Danes. The result was a spirited attack on the invading army, followed by its defeat and precipitate flight into Sweden. The war was then carried on with alternate success in different parts—in Pomerania, in Holstein, and in Norway; until at last the military career of Charles XII. came unexpectedly to a close in the end of 1718. Some time afterwards, negotiations were opened between Sweden and Denmark, under the mediation of England, and ended in 1720 in a definitive treaty of peace, concluded at Stockholm. It was then that Sweden lost all the advantages gained since the Peace of Westphalia, and that George I. of England, as elector of Hanover, Prussia, and Peter the Great shared with Denmark the spoil of Sweden. From that time no danger threatened Denmark from the side of its neighbour, though the cessation of the rivalry was more perceptible in the decline of Sweden than in the progress of Denmark.

The Danish Government had now ample experience of the sacrifices attendant on war, and of the expediency, to a state of such limited power, of avoiding political collisions. It consequently adopted a peace policy, to which it has almost ever since endeavoured to adhere.

It was towards the middle of the 18th century that the family of Bernstorff became known in the councils of Denmark,—the first minister of that name, a man of superior talent and information, having come forward at that time. By the prudence of the ministry, and the pacific disposition of the sovereign, Denmark was kept from taking part in the war begun in Germany in 1740, as well as in the more general conflict begun in the same country in 1756.

Frederick V. of Denmark was twice married, and died in 1766, leaving a son by each. The crown devolved on the elder, his son by the first wife, who took the name of Christian VII. He was a weak prince, and listened too readily to the insinuations of his step-mother, whose secret wish was to secure the succession of the crown to her own son, and who did not scruple, with that view, to sow discord between Christian and his young consort, a princess of England, the youngest daughter of George II. The queen dowager named Strauensee had ingratiated himself into the favour of Frederick V., the late king, and had found means to be appointed his prime minister—a situation which he was ill qualified to fill. He continued to hold that office under Christian, and was introduced to the young queen as her husband's confidential minister. On this the queen dowager founded an intrigue, and succeeded in persuading the king that the queen, in concert with Strauensee and his friend Count Brandt, had formed a project to set him aside, and to get herself declared regent of the kingdom. By working on the fears of this weak prince, the queen dowager prevailed on him to authorize the arrest of the queen and the two ministers. The latter were thrown into prison, and Strauensee was accused of having abused his authority as minister, and of other criminal acts. As there was no proof of these acts, recourse was had to the barbarous and inhuman punishment of torture, the dread of which led Strauensee to declare, in the form of a confession, much to the injury of the young queen, which is now considered as unfounded. Thus, however, did not enable him to escape, for he and Count Brandt were both beheaded in April 1772; while the queen consort was, at the instance of the British Government, allowed to retire and to pass the remainder of her short life at Zell, in Hanover, repeatedly but fruitlessly demanding an open trial. This ill-fated princess died in her twenty-third year, without the satisfaction of knowing that the author of her misfortunes, the queen dowager, had lost her influence at the court of Denmark.

One of the principal political questions between Great Britain and Denmark occurred in 1760, during the war carried on by England against France, Spain, and the North American colonies. During that arduous contest, England, superior at sea, had no difficulty in obtaining, by her own merchantmen, a supply of hemp, cordage, and other naval stores from the Baltic, whilst France and Spain trusted to receiving such supplies by neutral vesels. But the English Government denied the right of neutrals to carry warlike stores, and the northern powers, headed by the ambitious Catherine of Russia, entered into a compact, called the Armed Neutrality, by which, without resorting to actual hostility, they sought to overawe England, and to continue the questionable traffic. Happily no bloodshed followed this diplomatic menace, and the question fell to the ground in 1782, on the negotiation for a general peace.

The king of Denmark, subject all along to imbecility, became after 1784 quite incapable of governning. His son, the crown prince, was therefore appointed regent, and soon assumed the character of a minister. The peasants living on the crown lands were gradually emancipated—an example followed by a number of the nobility on their respective estates. In the abolition of the African slave trade Denmark had the honour of taking the lead among the Governments of Europe. The crown prince, guided by the counsels of Count Bernstorff, son of the minister already mentioned, long remained neutral in the political convulsion engendered by the French Revolution. He continued to adhere steadfastly to this plan until 1801 the emperor Paul of Russia having, as in the case of the Armed Neutrality, formed a compact of the northern powers hostile to England, a British fleet was sent into the Baltic under the orders of Sir Hyde Parker, with Lord Nelson as his second in command.

It was this fleet which taught the Danes that their capital was not impenetrable, and that the long line of men-of-war moored in front of the harbour was an insufficient defence against such enterprising opponents. The attack took place on 2d of April 1801, and the resistance of the Danes was spirited, but fruitless. The loss of the English so killed and wounded exceeded 1000 men; that of their opponents was much greater, and most of their shipping was destroyed. Happily little injury was done to the capital. A cessation of hostilities took place forthwith, and was followed by a treaty of peace. The death of Paul, which occurred soon afterwards, dissolved the compact between the northern courts.

But no treaty of peace could be regarded as permanent during the ascendancy of Napoleon. After defeating first Austria and then Prussia, that extraordinary man found means to obtain the confidence of the emperor Alexander of Russia, and in the autumn of 1807 threatened to make Denmark take part in the war against England. Although the Danish Government discovered no intention to violate its neutrality, the English ministers, eager to please the public by acting on a system of vigour, despatched to the Baltic both a fleet and an army, in order to secure the surrender of the Danish navy, upon condition of its being restored in the event of peace. To such a demand the crown prince gave an immediate negative, declaring that he was both able and willing to maintain his neutrality, and that his fleet could not be given up on any such condition.

On this the English army landed near Copenhagen, laid siege to that city, and soon obliged the Govern-
ment to purchase its safety by surrendering the whole of its naval force.

This act, the most questionable in point of justice of any committed by the British Government during the war, can hardly be defended on the score of policy. The resentment felt on the occasion by the emperor of Russia was so great as to deprive England during four arduous years of the benefit of his alliance; and the seizure of the Danish fleet so exasperated the crown prince and the nation at large, that they forthwith declared war against England, throwing themselves completely into the arms of France.

The hostilities between England and Denmark were carried on by sea, partly at the entrance of the Baltic, and partly on the coast of Norway. These consisted of a series of actions between single vessels or small detachments, in which the Danes fought always with spirit, and not unfrequently with success. In regard to trade, both nations suffered severely—the British merchants in the Baltic being ruined by Danish counterfeits, while the Danish trade of Denmark was in a manner suspended, through the naval superiority of England.

The situation of the two countries continued on the same footing during five years, when at last the overthrow of Bonaparte in Russia opened a hope of deliverance to those who were involuntarily his allies. The Danish Government would now gladly have made peace with England; but the latter, in order to secure the cordial cooperation of Russia and Sweden, had gone so far as to guarantee to these powers the cession of Norway on the part of Denmark. The Danes, ill prepared for so great a sacrifice, continued their connection with France during the eventful year 1813; but at the close of that campaign a superior force was directed by the allied sovereigns against Holstein, and the result was, first an armistice, and eventually a treaty of peace in January 1814. The terms of the peace were, that Denmark should cede Norway to Sweden, and that Sweden, in return, should give up Pomerania to Denmark. But Pomerania, being too distant to form a suitable appendage to the Danish territory, was exchanged for a sum of money and a small district in Lauenburg adjoining Holstein. On the part of England, the conquests made from Denmark in the East and West Indies were restored—all, in short, that had been occupied by British troops, excepting Heligoland.

After the Congress of Vienna, by which the extent of the Danish monarchy was considerably reduced, the court of Copenhagen was from time to time disquieted by a spirit of discontent manifesting itself in the duchies, and especially in that of Holstein, the outbreak of which in 1848 threatened the monarchy with complete dissolution. A short recapitulation of the relation of the different parts of the kingdom to each other will furnish a key to the better comprehension of these internal troubles. When Christian 1. of the house of Oldenburg ascended the throne of Denmark in 1448, he was at the same time elected duke of Schleswig, and was by his marriage incorporated into the duchies of Oldenburg and Delmenhorst. In 1544 the older branch was again divided into two lines, that of the royal house of Denmark, and that of the duchies of Holstein-Gottorp. Several collateral branches arose afterwards, of which those that survived were—the Augustenburg and Glucksburg branches belonging to the royal line, and the ducal Holstein-Gottorp branch, the head of which was Peter III. of Russia. In 1764, and subsequently confirmed by the emperor Paul, 1773, by which the ducal part of Schleswig was ceded to the Crown of Denmark. The earl abandoned also his part of Holstein in exchange for Oldenburgh and Delmenhorst, which he transferred to the younger branch of the Gottorp family. According to the scheme of Germanic organization adopted by the Congress of Vienna, the king of Denmark was declared member of the Germanic body on account of Holstein and Lauenburg, invested with three votes in the General Assembly, and had a place, the teutif in rank, in the ordinary diet.

After the restoration of peace in 1815, the states of the duchy of Holstein, never so cordially blended with Denmark as those of Schleswig, began to show their discontent at the continued non-convocation of their own assemblies despite the assurances of Frederick VI. The preparation of a new constitution for the whole kingdom was the main pretext by which the court evaded the claims of the inhabitants to the establishment of separate deliberative assemblies for each of the provinces failed to satisfy the Holsteiners, who continually urged the revival of their long-neglected local laws and privileges. Nor were matters changed at the accession in 1838 of Christian VIII., a prince noted for his popular sympathies and liberal principles. The feeling of national animosity was greatly increased by the issue of certain orders for Schleswig, which tended to encourage the culture of the Danish language to the prejudice of the German. The elements of a revolution were thus in readiness waited only for some impulse to break forth into action. Christian died in the very beginning of 1848, before the outbreak of the French revolution in February, and left his throne to his son Frederick VII., who had scarcely received the royal vouch when half of his subjects rose in rebellion against him.

In March 1848 Prince Frederick of Augustenburg, having gained over the garrison of Rendsburg, put himself at the head of a provisional Government proclaimed at Kiel. The Danish army, marching into Schleswig, easily reduced the duchy as far as the banks of the Exer; but, in the meantime, the new national assembly of Germany resolved upon the incorporation of Schleswig; and the king of Prussia followed up their resolution by sending an army into the duchies under the command of General Wrangel. The Prussian general, after driving the Danes from Schleswig, marched into Jutland; but on the 26th of August an armistice was signed at Malmo, and an agreement come to by which the government of the duchies was intrusted to a commission of five members—two nominated by Prussia, two by Denmark, and the fifth by the common consent of the four, Denmark being, however, with no better success for the requisitions made in Jutland.

After the expiry of the armistice, the war was renewed with the aid of Prussian troops and other troops of the confederacy (from March to July 1849), when Prussia signed a second armistice for six months. The duchies now continued to increase their own troops, being determined to carry on the war at their own charge without the aid of Prussia, whose policy they stigmatized as inconsistent and treacherous. The chief command of the Schleswig-Holstein army was intrusted to General Willisen, a scientific and able soldier; but henceforth the Danes had little to fear, especially as they could not be supplied with men and munitions. In the end a large number of volunteers to the camp of the Holsteiners. The last victory of the Danes, under general
Krogh and Schleppegrell, was at the battle of Isted (July 23). Near this small village, protected by lakes and bogs, William lay encamped with his centre, his right wing at Frederikshavn, extending along the Lake Langø, his left spreading along the Arhus lake. The Danes, apprea
cing on the high road from Flensburg to Schleswig, attacked the enemy on all sides; and, after having been repeatedly repulsed, they succeeded in driving the Schleswig- Holsteiners from all their positions. The forces engaged on each side were about 30,000, the number of killed and wounded on both sides was upwards of 7000.

After the victory of Isted, the Danes could hardly ex­pect to meet with any serious resistance, and the confidence of the court of Copenhagen was further increased by the peace which was concluded with Prussia (July 1560), by which the latter abandoned the duchies to their own fate, and soon afterwards added in their submission. The sole question of importance which now awaited its solution was the order of succession, which the European powers thought to be of such importance as to delay its final settle­ment till 1582.

The extinction of the male line in King Frederick was an event foreseen by the king, the people, and the foreign powers. After protracted negotiations between the differ­ent courts, the representatives of England, France, Austria, Russia, Prussia, and Sweden, a treaty relative to the succession was signed in London, May 8, 1582. Accord­ ing to this protocol, in case of default of male issue in the direct line of Frederick VII, the crown was to pass to Prince Christian of Glucksburg, and his wife the Princess Louisa of Hesse, who, through her ancestors, Charlotte of Denmark, was the niece of King Christian VIII.

The treaty of London did not fulfil the expectations of the agitators as to a settlement of the agitation in the duchies. The duke of Augustenburg had accepted the pardon held out to him on condition that his family resigned all claim to the sovereignty of the duchies, but he continued to stir up foreign nations about his rights, and when he died his son Frederick maintained the family pretensions. At last, in the autumn of 1583, Frederick VII. died very suddenly at the castle of Glucksburg, in Schleswig, the seat of his appointed successor. As soon as the ministry in Copenhagen received news of his death, Prince Christian of Glucksburg was proclaimed king as Christian IX., and the young duke of Augustenburg appeared in Schleswig, assuming the title of Frederick VIII. The claim of the pretender were supported by Prussia, Austria, and other German states, and before the year was out Generals Gabelz and Wrangel occupied the duchies in command of Austrian and Prussian troops. The attitude of Germany was in the highest degree of importance, and Denmark was called upon to give up Schleswig-Holstein to military occupation by Prussia and Austria until the claims of the duke of Augustenburg were settled. In its dilemma the Danish Government applied to England and to France, and receiving from these powers what it rightly or wrongly construed as encouragement, it declared war with Germany in the early part of 1584. The Danes sent their general, De Meza, with 40,000 men to defend the Danewerk, the ancient line of defences stretching right across the peninsula from the North Sea to the Baltic. The movements of the General De Meza were not, however, successful, the Danewerk, popularly supposed to be impregnable, was first outflanked and then stormed, and the Danish army fell back on the heights of Dybøl, near Flensborg, which was strongly fortified, and took up a position behind it, across the Little Belt, in the island of Alsen. This defeat caused almost a panic in the country, and, finding that England and France had no intention of aiding them, the Danes felt the danger of annihilation close upon them. The courage of the little nation, however, was heroic, and they made a splendid stand against their countless opponents - General Gerlach was sent to replace the unlucky De Meza, the heights of Dybøl were hard to take than the Germans had supposed, but they fell at last, and with them the strong position of Sonderburg, in the island of Alsen. The Germans pushed northwards until they overran every part of the mainland, as far as the extreme north of Jutland. It seemed as though Denmark must cease to exist among the nations of Europe, but the Danes at last gave way, and were content to accept the terms of the Peace of Vienna, in October 1584, by which Christian IX. renounced all claim to Lauenburg, Holstein, and Schleswig, and agreed to have no voice in the final disposal of those provinces.

For the next two years Europe waited to see Prussia restore North Schleswig and Alsen, in which Danish is the popular language, and which Austria had demanded should be restored to Denmark in case the inhabitants should express that as their wish. When the war broke out between Austria and Prussia in 1586, and resulted in the humilation of Austria, the chances of restoration passed away, and the duchies have remained an integral part of Prussia. With the overthrowing her dismember­ment, Denmark has prospered to an astonishing degree, and her maternal fortunes have been constantly in the ascend. Her only trouble within the last decade has arisen from the discussions in the two houses of assembly, and in the spread of dangerous communal opinions.

The following is a list of the monarchs of Denmark since the unionization of the kingdom under Germ the Old, with the dates of their accession —

<table>
<thead>
<tr>
<th>Name</th>
<th>Years</th>
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</thead>
<tbody>
<tr>
<td>Germ the Old</td>
<td>1042-1066</td>
</tr>
<tr>
<td>Harald Bluetooth</td>
<td>1066-1076</td>
</tr>
<tr>
<td>Harald</td>
<td>1076-1086</td>
</tr>
<tr>
<td>Knud the Great</td>
<td>1086-1092</td>
</tr>
<tr>
<td>Harthaknud</td>
<td>1092-1093</td>
</tr>
<tr>
<td>Magnus the Good</td>
<td>1093-1096</td>
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The House of Estridsen

<table>
<thead>
<tr>
<th>Name</th>
<th>Years</th>
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</thead>
<tbody>
<tr>
<td>Svend Estridson</td>
<td>1096-1104</td>
</tr>
<tr>
<td>Harald Hacn</td>
<td>1104-1107</td>
</tr>
<tr>
<td>Knud the Saint</td>
<td>1107-1108</td>
</tr>
<tr>
<td>Old Hunger</td>
<td>1108-1109</td>
</tr>
<tr>
<td>Erik Engel</td>
<td>1109-1110</td>
</tr>
<tr>
<td>Niela</td>
<td>1110-1113</td>
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<tr>
<td>Erik Harra</td>
<td>1113-1114</td>
</tr>
<tr>
<td>Erik the Lamb</td>
<td>1114-1117</td>
</tr>
<tr>
<td>Knud V and Svend III</td>
<td>1117-1119</td>
</tr>
<tr>
<td>Valdemar I</td>
<td>1119-1120</td>
</tr>
<tr>
<td>Knud VI</td>
<td>1120-1122</td>
</tr>
<tr>
<td>Valdemar II</td>
<td>1122-1123</td>
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<td>Erik IV</td>
<td>1123-1125</td>
</tr>
<tr>
<td>Avel</td>
<td>1125-1126</td>
</tr>
<tr>
<td>Christopher L</td>
<td>1126-1127</td>
</tr>
<tr>
<td>Erik V</td>
<td>1127-1129</td>
</tr>
<tr>
<td>Erik VI</td>
<td>1129-1130</td>
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The House of Glucksburg

<table>
<thead>
<tr>
<th>Name</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Christopher II</td>
<td>1130-1138</td>
</tr>
<tr>
<td>Frederik I</td>
<td>1138-1155</td>
</tr>
<tr>
<td>Christian II</td>
<td>1155-1166</td>
</tr>
<tr>
<td>Knud VII</td>
<td>1166-1171</td>
</tr>
<tr>
<td>Valdemar II</td>
<td>1171-1182</td>
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<tr>
<td>Erik IV</td>
<td>1182-1193</td>
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<tr>
<td>Avel</td>
<td>1193-1196</td>
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<tr>
<td>Christopher L</td>
<td>1196-1202</td>
</tr>
<tr>
<td>Erik V</td>
<td>1202-1210</td>
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<tr>
<td>Erik VI</td>
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The House of Oldenburg

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</thead>
<tbody>
<tr>
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<td>1228-1266</td>
</tr>
<tr>
<td>Hans</td>
<td>1266-1268</td>
</tr>
<tr>
<td>Christopher II</td>
<td>1268-1285</td>
</tr>
<tr>
<td>Frederik I</td>
<td>1285-1319</td>
</tr>
<tr>
<td>Christian III</td>
<td>1319-1320</td>
</tr>
<tr>
<td>Frederik II</td>
<td>1320-1340</td>
</tr>
<tr>
<td>Christian IV</td>
<td>1340-1370</td>
</tr>
<tr>
<td>Frederik III</td>
<td>1370-1375</td>
</tr>
<tr>
<td>Christian V</td>
<td>1375-1396</td>
</tr>
<tr>
<td>Frederik IV</td>
<td>1396-1400</td>
</tr>
<tr>
<td>Christian VI</td>
<td>1400-1402</td>
</tr>
<tr>
<td>Frendrik V</td>
<td>1402-1440</td>
</tr>
<tr>
<td>Christian VII</td>
<td>1440-1449</td>
</tr>
<tr>
<td>Frederik VI</td>
<td>1449-1449</td>
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The present language of Denmark is derived directly from the same source as that of Sweden, and the parent of both is the old Scandinavian (see SCANDINAVIAN LANGUAGES). In Iceland this tongue, with some modifications, has remained in use, and until about 1100 it was the literary language of the whole of Scandinavia. The influence of Low German first, and High German afterwards, has had the effect of drawing modern Danish constantly further from this early type. The difference began to show itself in the 12th century Rock, and after him Petersen, have distin­
guished four periods in the development of the language. The first, which has been called Oldest Danish, dating from about 1100 and 1250, shows a slightly changed character, mainly depending on the system of inflections. In the second period, that of Old Danish, bringing us down to 1400, the change of the system of vowels begins to be felt, and masculine and feminine are mingled in a common gender. An indefinite article has been formed, and in the conjugation of the verb a great simplicity sets in. In the third period, 1400–1530, the influence of German upon the language is supreme, and culminates in the Reformation. The fourth period, from 1550 to about 1650, completes the work of development, and leaves the language as we at present find it.

It was not till the fourth of these periods set in that literature began to be generally practiced in the vernacular in Denmark. The oldest laws which are still preserved are written in Danish of the second period. A single work of this nature is the 15th century collection of laws known as the Law of Henrick Harpstring, who died in 1424. The first royal edict written in Danish is dated 1386; and the Act of Union at Calmar, written in 1397, is the most important piece of the vernacular of the 14th century. Between 1300 and 1500, however, it is supposed that the Kjærkesper, or Danish ballads, a large collection of about 500 epic and lyrical poems, were originally composed, and those form the most precious legacy of the Middle Ages, whether judged historically or poetically. We know nothing of the authors of these poems, which treat of the heroic adventures of the great warriors and lovely ladies of the chivalric age in strains of artless but often exquisite beauty. The language in which we receive these ballads, however, is as late as the 16th or even the 17th century, but it is believed that they have become gradually modernized in the course of oral tradition. The first attempt to collect the ballads was made in 1591 by A. G. Vedel, who published 100 of them. Peder Syr printed 100 more in 1650. In 1813–14 an elaborate collection in five volumes appeared, edited by Abrahamson, Nyereup, and Rabbeck. Finally, Svend Grundtvig has lately been at work on an exhaustive edition, of which six thick volumes have appeared.

In 1490, the first printing press was set up at Copenhagen, by Gottfried of Ghemen, who had brought it from Westphalia; and five years later the first Danish book was printed. This was the famous Reimbronce, a history of Denmark in rhymed Danish verse, attributed to Niel, a monk of the monastery of Soro. It extends to the death of Christian 1, in 1481, which may be supposed to be approximately the date of the poem. In 1479 the university of Copenhagen had been founded. In 1506 the same Gottfried of Ghemen published a famous collection of proverbs, attributed to Peder Lolle. Mikkø, priest of St Alban's Church in Odense, wrote three sacred poems, The Rose-Garland of Maiden Mary, The Creation, and Human Life, which came out together in 1514, shortly before his death. These few productions appear alone, when innumerable works in Latin, and dimly heralded a Danish literature. It was the Reformation that first awoke the living spirit in the popular tongue. Christian Pedersen (1450–1534) was the first man of letters produced in Denmark. He edited and published, at Paris in 1514, the Latin text of the old chronicler, Saxo Grammaticus; he worked up in their present form the beautiful half-mythical stories of Karl Magnus and Holger Danske (Ogier the Dane). He further translated the Psalms of David and the New Testament, printed in 1529 and finally—in conjunction with Bishop Peder Paludan—the Bible, which appeared about 1550. Hans Tausen (1494–1561), continued Pedersen's work, but with far less talent. But Vedel (1582–1616), whose edition of the Kjærkesper, we have already considered, gave an immense stimulus to the progress of literature. He published an excellent translation of Saxo Grammaticus in 1575. The first edition of a Danish Renesance Fuchs appeared in 1555, and the first authorized Psalter in 1559. Arild Hvittingfield founded the practice of history by his Chronicle of the Kingdom of Denmark, printed in 10 vols., between 1593 and 1604. Hieronymus Rauch, who died in 1607, wrote some biblical tragedies, and is the first original Danish dramatist. Peder Clausen (1545–1623), a Norwegian by birth and education, wrote a Description of Norway, as well as an admirable translation of Seneque Sturlese's Hauakrugla, published ten years after Clausen's death.

The father of Danish poetry, Anders Arresø (1567–1637), was bishop of Trondhjem, but was deprived of his see for immorality. He was a poet of considerable genius, which is most brilliantly shown in Hexameron, a poem on the creation, in six books, which did not appear till 1749. He was followed by Andere Borling (1613–1677), a cheerful occasional versifier, and by Toger Rosenberg (1656–1742), a poet of somewhat higher gifts, who lived on into a later age. Among prose writers should be mentioned Peder Syr (1631–1703); Bishop Erik Fogt-puden (1616–178), whose Grammatica Danica, published in 1685, is the first systematic analysis of the language; and Birgitta Thott, a lady who translated Seneca and Epictetus.

In two spiritual poets the advancement of the literature of Denmark took a further step. Thomas Kingo (1634–1703) was the first who wrote Danish with perfect ease and grace. He was Scotch by descent, and retained the vital energy of his ancestors as a birthright. His Winter-Psaller, 1689, and the so-called Kingo's Psaller, 1699, contained brilliant examples of lyrical writing, and an employment of language at once original and national. Kingo had a charming fancy, a clear sense of form, and great rapidity and variety of utterance. Some of his best hymns are in the little volume he published in 1681, and hence the old period of semi-arcuate Danish may be said to close with this eventful decade, which also witnessed the birth of Holberg. The other great hymn-writer was Hans Adol Brorson (1694–1764), who published ten volumes in hisimitable aero-comic epics of Peder Faers, under the pseudonym of Hans Mikkelsen. In 1721 the first Danish play-house was opened in Copenhagen, and in four years Holberg wrote for it his first 29 comedies. He may be said to have founded the Danish literature; and his various works have still the same freshness and vital attraction that they had a century and a half ago. As an historian his style was terse and brilliant, his spirit philosophical, and his data singularly accurate. He united two unusual gifts, being at the same time the most cultured man of his day, and also in the highest degree a practical person, who clearly perceived what should most rapidly edify the national spirit.

In his 33 dramas, sparkling comedies in prose, more or less in imitation of Molière, he has left as most important...
positive legacy to literature. Nor in any series of comedies in existence is decency so rarely sacrificed to a desire for popularity or a false sense of wit.

Holberg found no school of immediate imitators, but his stimulating influence was wide and general. After the great conflagration, the university of Copenhagen was reopened in 1742, and under the auspices of the historian Gram, who founded the Society of Sciences, it recommended an active intellectual life. In 1744 Lanegeek founded the Society for the Improvement of the Danish Language, which opened the field of philology. In jurisprudence, Andreas Hoepr represented the new impetus, and in zoology Erik Pontoppidan, the younger. Thus last name represents a life-long activity in many branches of literature. From Holberg's college of Sorø, two learned professors, Smedegaard and Kraft, disseminated the seeds of a wider culture. All these men were aided by the generous and enlightened patronage of Frederick V. A little later on, the German poet Klostock settled in Copenhagen, bringing with him the prestige of his great reputation, and he had a strong influence in Germanizing Denmark. He founded, however, the Society for the Fine Arts, and it had richly endowed. The first prize offered was won by C. B. Tullin (1728-1765) for his beautiful poem of May day. Tullin, a Norwegian by birth, represents the first accession of a study of external nature in Danish poetry, he was an ardent disciple of the English poet Thomson. Ambrosius Stub (1707-1758) was a lyrant of great sweetness, born before his due time, whose poems, not published till 1782, belong to a later age than their author.

The Literary Renewal — Between 1742 and 1749, that is to say, at the very climax of the personal activity of Holberg, eight poets were born, who were destined to enrich the language with its first group of lyrical blossoms. Of these the eldest, Wessel and Ewald, were men of extraordinary genius, and destined to fascinate the attention of posterity, not only by the brilliance of their productions, but by the suffering and brevity of their lives. Joannes Ewald (1743-1781) was not only the greatest Danish lyrant of the 18th century, but he had few rivals in the whole of Europe. As a dramatist, pure and simple, his bird-like instinct of song carried him too often into a sphere too exalted for the stage, but he has written nothing that is not stamped with the exquisite quality of distinction. In The Fthers, which contains the Danish national song, Kong Kristian tod, the lyrical element is most full and charming; in Rolf Krag, and Bolders Death, Ewald was the first to foresee the revival of a taste for Scandinavian history and mythology; The Blunted Clappers, a polemical drama, shows that he also possessed a keen sense of humour. Wessel (1742-1785) excited even greater hopes in his contemporaries, but left less that is immortal behind him. After the death of Holberg, the affection of Gullerum had reappeared in Denmark, and the tragedies of Voltaire, with their stilted rhetoric, were the most popular dramas of the day. Nordahl Brun (1747-1816), a young writer who did better things later on, gave the finishing touch to the exotic absurdity by bringing out a wretched piece called Zarina, which was hailed by the press as the first original Danish tragedy, although Ewald's exquisite Rolf Krag, which truly merited that title, had appeared two years before. Wessel, who up to that time had only been known as the president of a club of wits, immediately wrote Love without Stockings, in which a plot of the most absurd triviality is worked out in strict accordance with the rules of French tragedy, and in most pompous and pathetic Alexandrines. The effect of this piece was magical, the Royal Theatre ejected its cuckoo-clock, French plays, and even the Italian opera. It was now essential that every performance should be national, and in the Danish language. To supply the place of the opera, native musucians, and especially Hartmann, set the dramas of Ewald and others, and thus the Danish school of music originated. Of the other poets of the revival the most important were born in Norway. Nordahl Brun, Caim Friman (1746-1829), Claus Fastung (1749-1791), C. H. Pram (1756-1821), and Edvard Storm (1749-1794) were associates and mainly fellow-students at Copenhagen, where they introduced a style peculiar to themselves, and distinct from that of the true Danes. Their lyrics celebrated the mountains and rivers of the magnificent country they had left; and, while introducing images and scenery unfamiliar to the inhabitants of the monotonous Denmark, they enriched the language with new words and phrases. This group of writers are now claimed by the Norwegians as the founders of a Norwegian literature, but their true place is certainly among the Danes, to whom they primarily appealed. They added nothing to the development of the drama, except in the person of N. K. Bredal (1733-1778), who became director of the Royal Danish Theatre, and the writer of some mediocre plays.

To the same period belong a few prose writers of eminence. Werner Abrahamson (1714-1812) was the first aesthetic critic Denmark produced. Johan Clemens Tode (1736-1806) was eminent in many branches of science, but especially as a medical writer. Ove Mellin (1747-1820) was an untiring collector of historical data, which he annotated in a lively style. Two historians of more definite claim on our attention are Peter Frederik Suhm (1728-1806) and Ove Goldberg (1731-1808). In theology, Hans Hoffmann (1740-1819) and Ewald (1714-1816) demand a reference. But the only really great prose-writer of the period was the Norwegian Niels Treschow (1751-1833), whose philosophical works are composed in an admirably lucid style, and are distinguished for their depth and originality.

The poetical revival sunk in the next generation to a more mechanical level. The number of writers of some talent was very great, but genius was wanting. Two intimate friends, Een (1760-1821) and Zelitzi (1761-1821), attempted, with indifferent success, to continue the tradition of the Norwegian group. The same Treschow (1794-1821) was a fluent and eloquent writer of occasional poems. The early death of Ole Samse (1759-1796) prevented the development of a dramatic talent that gave rare promise. But while poetry languished, prose, for the first time, began to flourish in Denmark. Knud Lyne Baike (1760-1830) was a pleasing novelist, a dramatist of some merit, a poet, etc., and a witty song-writer, he was also a man full of the literary instinct, and through a long life he never ceased to busy himself with editing the works of the older poets, and spreading among the people a knowledge of Danish literature. Peter Andreas Heiberg (1758-1841) is best known as the husband and the father of two of the greatest Danish writers, but he was himself a political and aesthetic critic of note. He was exiled from Denmark in company with Malte Conrad Brun (1775-1826), who settled in Paris, and attained a world-wide reputation as a geographer. O C. Olufsen (1764-1827) was a writer on geography, zoology, and political economy. Rasmus Nyrop (1779-1829) expended an immense energy in the compilation of admirable works on the history of language and literature. From 1778 to his death he exercised a great power in the statistical and critical departments of letters. The best historian of this period, however, was Engelstoft (1774-1850), and the most brilliant theologian Bishop Münster (1773-1834). In the annals of modern literature the name of Christian Oersted (1777-1851) is a name universally honoured. He explained his inventions and described his discoveries in language so lucid and so char
acteristic that he claims an honoured place in the literature of the country of whose culture, in other branches, he is one of the most distinguished ornaments.

We pause on the threshold of the romantic movement to record the name of a man of great genius, whose work was entirely independent of the influence around him. Jens Baggesen (1764-1826) is the greatest comic poet that Denmark has produced. As a dramatist he failed; as a philosophic and critical writer he has not retained the attention he once commanded; but as a satirist and witty lyrist he has no rival among the Danes. In his hands the difficulties of the language disappear; he performs with the utmost ease extraordinary tours de force of style. His astonishing talents were wasted on trifling themes and in a fruitless resistance to the modern spirit in literature.

Romanism.—With the beginning of the 19th century the new light in philosophy and poetry, which radiated from Germany through all parts of Europe, found its way into Denmark also. In scarcely any country was the result so rapid or so brilliant. There arose in Denmark a school of poets who created for themselves a reputation in all parts of Europe, and would have done honour to any nation or any age. The splendid cultivation of metrical art threw other branches into the shade; and the epoch of which we are about to speak is eminently the all for mastery over verse. The swallow who heralded the summer was a mark has produced, and at his best he yields to no one in choice and skilful use of expression. This sweet song of Schack-Staffeldt's, however, was early silenced by the louder choir that one by one broke into music around him. It was Adam Gottlob Oehlenschlager (1779-1850), the greatest poet of Denmark, who was to bring about the new romantic movement. Oehlenschlager had already written a great many verses in the old semi-didactic, semi-rhetorical style, when in 1802 he happened to meet the young Norwegian Henrik Steffens (1773-1849), who had just returned from a scientific tour in Germany, full of the doctrines of Schelling. Under the immediate direction of Steffens, Oehlenschlager commenced an entirely new poetic style, and destroyed all his earlier verses. A new epoch in the language began, and the rapidity and matchless facility of the new poet was the wonder of Steffens himself. The old Scandinavian mythology lived in the hands of Oehlenschlager exactly as the classical Greek religion was born again in Keats. After twelve years of ceaseless labour, and the creation of a whole library of great works, the vigour of Oehlenschlager somewhat suddenly waned, and he lived for nearly forty years longer, completely superseded by younger men, and producing few and mainly inferior works. Since and except Holberg no author has possessed so great an influence on Danish letters as Oehlenschlager. He aroused in his people the alumbrering sense of their Scandinavian nationality.

The retirement of Oehlenschlager comparatively early in life to the way opened by his younger contemporaries, among whom several had genius little inferior to his own. Steen Steensen Blicher (1782-1848) was a Jutlander, and preserved all through life the characteristics of his sterte and sombre fatherland. After a struggling youth of great poverty, he at length, in 1814, published a volume of lyrical poems; and in 1817 he attracted considerable attention by his descriptive poem of the Tour in Jutland. His real genius, however, did not lie in the direction of verse; and his first signal success was with a volume of stories in 1824, which were rapidly followed by others for the next twelve years. Blicher is a stern realist, in many points akin to Crabbe, and produces a singular position among the romantic idealists of the period, being like them, however, in the love of precise and choice language, and hatred of the mere commonplace of imaginative writing.

Nikolai Frederik Severin Grundtvig (1783-1872), like Oehlenschlager, learned the principles of the German romanticism from the lips of Steffens. He adopted the idea of introducing the Old Scandinavian element into art, and even into life, still more earnestly than the older poet. There was scarcely any branch of letters in which Grundtvig did not distinguish himself; he was equally influential as a politician, a theologian, a poet, and a social economist.

Bernhard Severin Ingemann (1783-1862) was a man in every way unlike the last-mentioned poet. A mild, idyllic mind, delicately appreciative of the gentler manifestations of nature, and shrinking from violent expression of any sort, distinguished the amiable Ingemann. His greatest contributions to Danish literature are the historical romances which he published in middle life, strongly under the influence of the novels of Sir Walter Scott. Several of these, particularly Valdemar Seier and Prince Otto of Denmark, have enjoyed and still enjoy a boundless popularity. He is remarkable as the first importer into Scandinavia of the historical novel, since very generally cultivated.

Johannes Carsten Hauch (1790-1872) first distinguished himself as a disciple of Oehlenschlager, and fought under him in the strife against the old school and Baggesen. But the master misunderstood the disciple; and the harsh repulse of Oehlenschlager silenced Hauch for many years. He possessed, however, a strong and fluent genius, which eventually made itself heard in a multitude of volumes, poems, dramas, and novels. All that Hauch wrote is marked by great qualities, and by distinction; he had a native bias towards the mystical, which, however, he learned to keep in abeyance.

Johann Ludvig Heiberg (1791-1860) as a critic ruled the world of Danish taste for many years, and his lyrical works were signally successful. He had the genius of good taste, and his witty and delicate productions stand almost unique in the literature of his country.

The mother of J. L. Heiberg, the Countess Gyllembourg (1796-1876), was the greatest authoress which Denmark has possessed. She wrote a large number of anonymous novels, which began to appear in 1828 in her son's journal, The Flying Post. Her knowledge of life, her sparkling wit, and her almost faultless style, make these short stories, the authorship of which remained unknown until her death, master-pieces of their kind.

Ludwig Adolf Bodich (1793-1874) wrote only one single volume of lyrical poems, which he gradually enlarged in succeeding editions. He was a consummate artist in verse, and his impressions are given with the most delicate exactitude of phrase, and in a very fine strain of imagination. Most of his poems deal with Italian life, which he learned to know thoroughly during a long residence in Rome. He was the secretary of Thorwaldsen for a considerable time.

Christian Winther (1796-1876) made the island of Zealand his loving study, and that province of Denmark belongs to him no less thoroughly than the Cumberland lakes belong to Wordsworth. Between the latter poet and Winther there was much resemblance. He was, without compare, the greatest pastoral lyricist of Denmark. His ex-
quite strains, in which pure imagination is blended with most accurate and realistic descriptions of scenery and rural life, have an extraordinary charm not easily described.

The youngest of the great poets born during the last twenty years of the 18th century was Henrik Hertz (1798-1870). He was the most tragic and splendid lyrast of the period, a sort of troubadour, with little of the Scandinavian element in his writing. It is true that in some of his dramas, particularly in *Sned Dyring's House*, 1837, the theme and plot were taken from Danish history, but the spirit of his poems was distinctly southern. As a satirist and comic poet he followed Baggesen, and in all branches of the poetic art stood a little aside out of the main current of romanticism. In his best pieces, at the same time, he is the most modern and most cosmopolitan of the Danish writers of his time.

It is noticeable that all the great poets of the romantic period lived to an advanced age. Of the ten writers last considered, five died at an age of more than eighty, and the briefest life lasted to the confines of seventy years. This prolonged literary activity—for some of them, like Oluf Præst, were busy to the last—had a slightly damping influence on their younger contemporaries, and since their day fewer great names have arisen. Four poets of the next generation, however, deserve most honourable mention.

Hans Christian Andersen (1805-1875), the greatest of modern fabulists, was born in very humble circumstances at Odense in Funen. His life was a struggle for existence, in the course of which he suddenly found himself famous. He attempted lyrical and dramatic poetry, novels, and travels, before he discovered the true bent of his genius. In all these branches of literature he escaped failure, but without attaining brilliant success. In 1834 there appeared the first collection of his *Fairy Tales*, and won him a world-wide reputation. Almost every year from this time forward until near his death he published about Christmas time one or two of these unique stories, so delicate in their humour and pathos, and so masterly in their simplicity. He also wrote, later in life, some excellent novels, *The Two Baronesse, Only a Player*, and others, his early story of *The Improvisatore*, 1835, has also considerable charm. Andersen was an incessant wanderer over Europe, and the impressions of his travels form a series of interesting, if egotistical, memoirs.

Carl Christian Bagger (1807-1846) published volumes in 1834 and 1836 which gave promise of a great future,—a promise broken by his early death. Frederik Paludan-Müller (1809-1876) survived much longer, and slowly developed a brilliant poetical career. He is one of the greatest names of Danish literature. His mythological dramas, his great satiric epos of *Adam Homo* (1841-48), his comedies, his lyrics, and above all his noble philosophical tragedy of *Aðalinn*, prove the immense breadth of his compass, and the unexhaustible riches of his imagination.

The poets completely ruled the literature of Denmark during this period. There were, however, some eminent men in other departments of letters, and especially in philology. Rasmus Christian Rask (1787-1832) was one of the most original and gifted linguists of his age. His grammars of Old Frisian, Icelandic, and Anglo-Saxon were unapproached in his own time, and are still admirable. Niels Matthias Petersen (1791-1862), a disciple of Rask, was the author of an admirable *History of Denmark in the Heathen Antiquity*, and the translator of many of the Sagas. Christian Mølbech (1789-1859) was a laborious lexicographer, author of the first good Danish dictionary, published in 1833. In Joachim Frederik Schouw (1789-1853), Denmark produced a very eminent botanist, author of an exhaustive *Geography of Plants*. In later years he threw himself with zeal into politics. His botanical researches were carried on by Frederik Lübbmann (1813-1856). The most famous zoologist contemporary with these was Salomon Dreier (1813-1842).

The romanticists found their philosopher in a most remarkable man, Soren Aaby Kierkegaard (1813-1855), one of the most subtle thinkers of Scandinavia, and the author of *The Concept of the Idea*. He produced an excellent translation of Shakespeare, 1807-1816, and Thomas Overskou (1788-1873), author of a long series of successful comedies.

**Recent Period**—Three living writers connect the age of romanticism with the literature of to-day. Parno Carl Møll (born 1818) is a vigorous politician and poet, violently Pan-Scandinavian, and editor of the newspaper *Fædrelandet*. Meyer Aron Goldschmidt (born 1818) the life-long opponent of Møll in politics and journalism, is the author of some novels written in the purest Danish, and with great vivacity and art. Jens Christian Hostrup (born 1818) is by far the best of the younger dramatists, having produced between 1843 and 1855 a series of exquisite comedies, unrivalled in delicacy and wit.

Hans Vilhelm Kaalund (born 1816) is a lyrist of much sweetness and force. He has lately published a good tragedy, *Fulera*. Erik Bogh (born 1827) is the author of inimitable songs, vaudevilles, and jeux d'esprit. Christian Richardt (born 1831) is the man of most decided genius among the younger poets. His four volumes of lyrical poems include some exquisite and many admirable pieces.

Holger Drachmann (born 1847) is a young poet, novelist, and painter of amazing fecundity, and great, though still uncertain, promise.

The greatest living Danish zoologist is Johannes Jaepus Smith Steenstrup (born 1815). Jens Jakob Armussen (born 1819) is an eminent antiquarian. Johan Nikolai Madvig (born 1804) is celebrated as a philologist, and particularly as one of the most eminent of modern Latinists. A young disciple of Madvig, Vilhelma Thomsen, has distinguished himself by his researches into the Scaldic languages. Rasmus Nielsens (born 1800) and Hans Brochner (born 1830) are the two most eminent philosophers who have proceeded from the school of Kierkegaard. In aesthetic criticism no recent writer has approached—in knowledge, catholicy, and eloquence—Georg Brandes (born 1842), who stands alone among the writers of his country as an advocate for the most liberal culture and the most advanced speculation.

**Fine Arts**—Within the present century the fine arts have been successfully cultivated in Denmark. In painting there has been displayed of late years an increase in power and variety. The father of Danish painting, Nikolaj Abildgaard (1744-1809), was a man of great but rhetorical talent, taught in the French school of his day. Jens Juel (1745-1802), a portrait-painter of the same age, is a great favourite among the Danes. It was, however, the Danish painters reproduce what they see around them with photo-
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graphite precision, they are singularly cold in colour and void of imagination. Marstrand (1810–1870) was by far the most richly-gifted of the pupils of Eckersberg; his best works are full of brilliant qualities, and would command admiration in any country. Sonne (born 1801) has made himself a name by painting a series of large canvases representing the war against the French. When he quitted the academy he made the tour of Europe, in the course of which he acquired a strong prejudice against foreign manners and customs, and became confirmed, as was natural in one born and brought up a Whig, in his dislike of foreign Governments. On his return to England he became acquainted with Dryden, Wycherly, Congreve, and Southerne, whose conversation, inspiring him with a passion for poetry, and a contempt for every attainment that had not in it something of the belles lettres, diverted him from entering any profession. He lived for a time on a small fortune he had inherited from an uncle, but this was soon squandered. Through the patronage of the duke of Marlborough, to whom he had recommended himself by his zeal for the Protestant cause, he obtained a place in the customs worth £120 per annum. After some years, however, his extravagance reduced him to the necessity of disposing of it; but, in selling it, he reserved to himself an annuity for a term of years. Outliving this term, he was in the closing years of his life reduced to extreme necessitv.

Denis was the author of several small poems of little merit, and one or two plays which possess none, though one at least of the latter was received with considerable favour at the time of its production, on account of its hitting the strongest popular prejudices then existing. His tragedy of Love Amended, produced at Lincoln's Inn Fields theatre in 1704, was fiercely anti-French, and as such met with warm sympathy and approval. Denis conceived the insane idea that by writing it he had roused the implacable resentment of the French Government, and amusing stories are told of the precautions he took in consequence. He is said to have visited the duke of Marlborough, previous to the negotiations for the peace of Utrecht, and asked him to secure the insertion of a special clause in the treaty protecting his person from vengeance. On another occasion the appearance of an approaching vessel is said to have caused him to write a letter to London from a friend's house on the coast of Sussex. His tragedy of Agrippa and Virginia, produced at Drury Lane in 1709, was unsuccessful. It is memorable only on account of a peculiar kind of thunder used in the performance, which was both novel and effective. A few nights after the failure of his play Dennis, sitting in the pit, heard the thunder introduced into the tragedy of Macbeth, whereupon he rose and cried to the audience, "They won't act my tragedy, but they steal my thunder." But for his inordinate vanity, and an infirmity of temper that fall little short of insanity, Dennis might have made some mark in literature as a critic. His reviews of Pope's Essay on Man and Addison's Cato showed considerable discernment and not a little wit; but they were disfigured by bitter personal feeling. As his attacks were almost always on persons of abilities greatly superior to his own, like Addison, Steele, and Pope, their replies usually turned opinion strongly against him, irritating his testy temper, and rendering him a perpetual torment to himself. Pope pilloried him in the Dunciad, and in the following epigram—

Should Dennis publish you had stabb'd your brother, Lampoon'd your mother, or damned your mother.— Say, what revenge on Dennis can be had! Too dull for laughter, for reply too mad; On one so poor you should not look the law; On one so old your sword you scorn to draw. Uncog'd then let the harmless monster range, Secure in dulness, madness, want, and age.
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At length, after a long life of vicissitudes, he was compelled to receive obligations from those whom he had been continually reviling. In the very close of his days a play was acted for his benefit at the little theatre in the Haymarket, through the good offices of Thomas Mallet, and Pope. It is much to the credit of Pope especially that, notwithstanding the gross manner in which Dennis had calumniated him on many occasions, he took part in the arrangements, and even wrote an occasional prologue to the play, which was spoken by Cibber. Not long after this Dennis died, on the 6th of January 1731.

DENON, DOMINIQUE VIVANT, BARON DE (1747–1825), artist and archaeologist, was born at Chillon-sur-Saône on the 4th January 1747. His parents sent him to Paris to study law, but he showed from the first a decided preference for art and polite literature, and he soon gave up his professional studies. In his twenty-third year he produced a comedy, Le bon père, which obtained a succès d’estime, its author having already made himself a favourite in society by his agreeable manners and exceptional conversational powers. He brought his parents to visit Voltaire at Ferney. He took a portrait of the philosopher, which was engraved and published on his return to Paris. His next diplomatic appointment was to Naples, where he spent seven years, first as secretary to the embassy and afterwards as chargé d’affaires. He devoted this period to a careful study of the monuments of ancient art, collecting many specimens and making drawings of others. He also perfected himself in etching and mezzotinto engraving. The death of his patron, M. de Vergennes, in 1787, led to his recall, and the rest of his life was given mainly to artistic pursuits. On his return to Paris he was admitted a member of the Academy of Painting. After a brief interval he returned to Italy, and resided for some years chiefly at Venice. He also visited Florence and Bologna, and afterwards the proscribed, and with Madame de Pompadour, attached to the French embassy at St Petersburg. On the accession of Louis XVI. Denon was transferred to Sweden, but he returned, after a brief interval, to Paris with the ambassador M. de Vergennes, who had been appointed foreign minister. In 1775 Denon was sent on a special mission to Switzerland, and availed himself of the opportunity to visit Voltaire at Ferney. He took a portrait of the philosopher, which was engraved and published on his return to Paris. His next diplomatic appointment was to Naples, where he spent seven years, first as secretary to the embassy and afterwards as chargé d’affaires. He devoted this period to a careful study of the monuments of ancient art, collecting many specimens and making drawings of others. He also perfected himself in etching and mezzotinto engraving. The death of his patron, M. de Vergennes, in 1787, led to his recall, and the rest of his life was given mainly to artistic pursuits. On his return to Paris he was admitted a member of the Academy of Painting. After a brief interval he returned to Italy, and resided for some years chiefly at Venice. He also visited Florence and Bologna, and afterwards went to Switzerland. While there he heard that his property had been dispersed, and his papers placed on the list of the proscribed, and with characteristic courage he resolved at once to return to Paris. His situation was critical, but he found support and protection in the friendship of the painter David, who obtained for him a commission to furnish designs for republican costumes. This he did to the satisfaction of the Revolutionists, and his name was removed from the list of emigrants. When the terrors of the Revolution were over, Denon was one of the numerous band of eminent men who found a congenial resort in the house of Madame de Beaumarchais. Here he formed the acquaintance of Bonaparte, to whose fortunes he attached himself with the happy instinct of one who was always quick to discern the coming power. On the special invitation of the general he joined the expedition to Egypt, and thus found the opportunity of gathering the materials for his most important literary and artistic work. He accompanied General Bonaparte to Upper Egypt, and made numerous sketches of the monuments of ancient art, sometimes under the very fire of the enemy. The results were published in his Voyage dans la basse et la haute Egypte (2 vols. fol., with 141 plates, Paris, 1802), a work which crowned his reputation both as an archaeologist and as an artist. In 1804 he was appointed by Napoleon to the important office of director-general of museums, which he filled greatly to the benefit of art and artists until the restoration in 1815, when he had to retire. He was a devoted friend of Napoleon, whom he accompanied in his expeditions to Austra, Spain, and Poland, taking occasions with his wonted fearlessness on the various battle-fields, and guiding the conqueror in his choice of spoils of art from the various cities that were pillaged. After his retirement he occupied himself with the preparation of a profusely illustrated history of ancient and modern art, in which he had the co-operation of several skilful engravers. He died at Paris on the 27th April 1826, leaving the work unfinished. It was published posthumously, with an explanatory text by Amasy de Duval under the title Monuments des Arts du dessin chez les peuplant l’Ancien et le Modernes, recueillis par Vivant Denon (4 vols. fol., Paris, 1829).

DENTISTRY The province of dentistry embraces the art of treating diseases and lesions of teeth, and supplying artificial substitutes in the place of these organs when lost. Disease of the teeth is not always a mere local affection but may, and very generally does, arise from constitutional causes. With cases of the latter description the dentist, unless qualified as a surgeon or physician, is not in a position to deal, except in so far as to repair or ameliorate the morbid condition of the organs. The system leading in some way to disorders of the dental tissues are various and dissimilar in their nature; and the exact connection between such morbid conditions and their effects upon the teeth is not well understood. In this way the diagnosis, the treatment, and the removal of the cause might be considered more properly the duty of the general practitioner than of the specialist. Up to a very recent date this has been more particularly the case, dentists until lately having in the greater number of instances been educated with a view to proficiency in the mechanical rather than the surgical department of their profession, while what surgical knowledge they, in a few cases, did acquire was confined to certain facts connected exclusively with the organs upon which they were expected to operate. From the Lawec for 5th June 1876 it appears that not only all the numerous body of so-called surgeon-dentists of the United Kingdom then possessed in reality any medical or surgical diploma at all.¹

¹ Indeed it is comparatively of late years that dentistry has occupied anything like a properly recognized position among the different departments of minor surgery, for long it was practised to a large extent as a superfluous means of livelihood by persons engaged in some other pursuit, and without any professional education whatever. The blacksmith, barber, watchmaker, and others of the same class were the dentists of every village and country town; while even in some of our larger cities dentists of the kind were till lately to be found practising under the very shadow of universities and medical schools. The explanation of this seems to have been that more tooth-drawing constituted the surgical dentistry of these days, and as the operation is one demanding muscular strength and manual dexterity more than anatomical knowledge or surgical skill, and was performed as successfully in many cases by the irregular as by the regular practitioners, it had not many attractions for medical men. It was accordingly consigned to the uneducated and the charlatan, who did not fail with proverbial unscrupulousness to parade their specialty as sufficient to confer a surgical status on those performing it, and to mystify them to the designation of surgeon-dentist—a designation which has ever since been applied without discrimination or distinction to qualified or unqualified practitioners in this particular branch. In 1840 or 1841 this state of matters seems to have attracted the attention of the profession, and, after much consideration, some anxiety was manifested by its more respectable members to be recognised in the new Medical Act of 1843, then being introduced by Sir James Graham. Both then and later, however, the fully qualified medical men were object to the fractionally qualified surgeons being made on an equal footing with themselves. The profession may at this time be said to have divided itself into three sections,—1st, those who were authorised to see all diseases affecting the teeth and the maladies connected with them; 2nd, those who were authorised to see all diseases affecting the teeth and the maladies connected with them; 3rd, those who were authorised to see all diseases affecting the teeth and the maladies connected with them.
A special examination in dentistry now exists in connection with the Royal College of Surgeons of England for students training in that profession, a certain amount of information being required in various branches of medicine and surgery. A curriculum of studies in those departments has been arranged; and candidates who can produce certificates of attendance on it are admitted for examination, and, if found fit, receive a certificate entitling them to practice as dentists.

In America this special system has for long been adopted and carried to a much greater extent. Colleges of dentistry are established in many of the leading cities there, each with what they designate a faculty of professors in the various departments of the art. In the Dental Cosmos, vol. xvii. No. 11, an American periodical, advertisements appear of seven different dental colleges, with seventy-eight professors, demonstrators, &c. The professors in these institutions comprehend those of mechanical dentistry, operative dentistry, dental physiology, dental pathology, dental therapeutics, mechanical dentistry and metallurgy, immun chemists, etc. In course of the upper jaw in dentistry—"doctor of dental surgery," or of "dental medicine," as the case may be,—is conferred, the general fee for which seems to be $30, on the candidates having fulfilled the curriculum and passed the examination.

In the medical schools and examining boards in Scotland all this is different. No special or formal diplomas in these are given by the Royal College of Surgeons or other licensing body, while diseases of the teeth and adjacent structures are understood to be made subjects of lecture and examination in the same manner as other regional or special diseases occurring in the practice of medicine or surgery; and as great are the improvements certainly are which such arrangements as those of England and America are on the old system, still it is to be hoped, and it is likely, that ere long practitioners devoting themselves to dental surgery will,—like oculists, or aurists, or obstetricians, or other physicians or surgeons restricting themselves to or selecting one branch of practice in preference to another,—be at the same time fully qualified medical men.

The temporary set of teeth begins to be shed between the sixth and eighth months of infant life,—these are generally succeeded in a few weeks by those of the upper jaw; the two lateral incisors of the upper jaw next appear about the eighth or ninth month, and those of the lower jaw quickly follow; the anterior molars of the lower jaw are cut about the twelfth, fourteenth, or sixteenth month, and those of the upper jaw immediately after; the canines appear about the seventeenth or eighteenth month, generally those in the upper jaw first; those of the second set of teeth at the age of two and a half years the second milk molars have usually commenced to appear, thus completing the temporary set of teeth at the age of about three years.

The temporary set of teeth begins to be shed between the sixth and eighth months of infant life. Previous to this, however, the first permanent molars are cut, generally about the age of seven. These are followed by the central and then by the lateral incisors. Next come the anterior bicuspid about nine years old; the posterior about ten or eleven; the canines about twelve; the second molars at thirteen; and the last molars, or wisdom teeth, from the eighteenth to the twenty-fifth years of life. Deviations from the order and time of appearance of both sets occur, but the above may be regarded as the general rule in the evolution of the temporary and permanent teeth of the human subject.

Structure and Form of Teeth.—The structure of both sets may be said to be the same. The body of each tooth is composed of a dense bony substance termed dentine. This is invested on the crown by a cap of still more dense material termed enamel; while the root, or fang, is coated externally by a layer of a softer substance, closely resembling ordinary bone, and termed cement. In the centre of each fang, and extending into the body of the tooth, is a hollow canal termed the pulp cavity, for the passage of vessels and nerves.

In form the incisors of both jaws are single-fanged, as are also the canines. The bicuspid of the lower jaw are also single-fanged, while those of the upper jaw are occasionally double-fanged, or have a single fang bident at its extremity. The lower molars, both temporary and permanent, possess two fangs, one behind the other. These two fangs are widely separated in the temporary molars, while, on the other hand, in the posterior molars of the permanent set they are not uncommonly united into one. The upper molars of both sets possess three fangs—two external or cheek fangs placed one behind the other, and a third situated on that side at an extreme distance. No such spaces exist between any of the teeth in the dental arch of man as occur in the lower animals. In this way, the crown is small, or where unusually rapid or simultaneous appearance of the members of the second, or persistence of those of the first set occurs, irregularity of the teeth results. This is sometimes increased by the evolution of supernumerary teeth, these being generally out of the line of the others; and occasionally matters are rendered worse by the natural teeth being themselves of unusually large size. Cases also occur in which the number of the teeth is defective, and some rare instances have been recorded where these organs never appeared at all.

The remedy in cases of dental irregularity is to remove

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For anatomy of the dental system see p. 10 of the present volume.

the number and class of these organs is different. Here only 20 members of the series exist, and are divided into four incisors, two canines, and four molar teeth, similarly placed—ten in each jaw. The four temporary molar teeth represent or rather precede the four bicuspid teeth of the adult set, while the six molars above and below of the adults are not represented in the temporary set at all. In other words, the true permanent molar teeth have no predecessors.

Dentition.—The temporary set appear, or are cut, as follows. The two lower central incisors appear between the sixth and eighth months of infant life—these are generally succeeded in a few weeks by those of the upper jaw; the two lateral incisors of the upper jaw next appear about the eighth or ninth month, and those of the lower jaw quickly follow; the anterior molars of the lower jaw are cut about the twelfth, fourteenth, or sixteenth month, and those of the upper jaw immediately after; the canines appear about the seventeenth or eighteenth month, generally those in the upper jaw first; and before the age of two and a half years the second milk molars have usually commenced to appear, thus completing the temporary set of teeth at the age of about three years.

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by extraction such teeth as are in the way, and by mechanical contrivances, known as regulating plates, to apply pressure in such a manner as will move the misplaced tooth or teeth into their normal position, and retain them there for some time afterwards. Such plates are constructed on the same principles, and of the same materials, as the bases of artificial sets, which will come to be treated of afterwards. It not unfrequently happens that nature, if left to itself, effects a wonderful improvement in cases of dental irregularity. This is frequently observable where it is the upper canines which are misplaced. These teeth when appearing, as they often do, outside and much above the necks of the adjoining teeth, occupy a long time in descencling, and in certain cases the anterior portion of the maxillary arch seems to enlarge sufficiently to afford space for their almost perfect arrangement during this period. The same thing occurs, but to a less marked extent, in the case of other teeth; in general, however, nature requires to be assisted by art in some way, as has been above indicated, where the irregularity extends to any great amount.

Diseases of Teeth.—The teeth being living organisms are, like other structures in the animal body, subject to disease. Some of the diseases bear a close resemblance to mere chemical decomposition, such as occurs in dead or inorganic matter, and at a certain stage of some dental affections a process of the kind does no doubt occur; but this is so mixed up with, and accompanied and preceded by vital action, that to consider it as a mere chemical or physical lesion would be pathologically incorrect. Various arguments have been advanced by its advocates in support of the chemical theory of dental caries; but however ingenious or specious these at first sight appear, they fail to explain many phenomena in the origin, the period of occurrence, and the stages and progress of this disease, unless the vital element in its nature be also taken into account.

Dental caries, or decay of the teeth, may briefly be described as consisting in a previous imperfect development, or in the access of some morbid action interfering with the nutrition or vitality of their tissues, thus rendering them liable to any destructive agencies to which they may be subjected, by which they become disorganized, disintegrated, and broken down, leaving the sensitive pulp exposed, whereby acute pain is occasioned, especially when the destruction of the protective tooth substance has been rapid. Sometimes the process of decay is insidious and unobserved. Its advent is then supposed to have been sudden, and its progress more speedy than has really been the case. This, however, in many instances arises from the condition of matters being overlooked until the enamel, which resists destruction longest, being undermined and falling in, reveals for the first time the cavity existing underneath. Pain, probably also for the first time, is then experienced from exposure and irritation of the dentinal pulp, and toothache, as it is termed, is produced.

Necrosis, or death of a whole tooth, is another lesion to which these organs are liable. This may result from either acute or chronic inflammation in the tissues connecting them with the jaw, or from a blow, or from any other cause leading to their vascular supply being cut off. The necrosis may involve the whole tooth, or it may be partial—as, for example, where it is limited to one fang of a multiple fanged tooth. In these cases there may be no breaking down of texture, but the tooth becomes discoloured, loosed, extruded, and at last detached from its socket, from which after a time, and generally after considerable uneasiness, it drops out.

Exostosis, or a morbidly increased growth of certain parts of a tooth, being in almost every instance confined to the cementum, describes as covering the fang or root, is an affection somewhat obscure in its outward symptoms. It is generally a consequence of previous disease of the tooth, leading to chronic inflammation of the textures covering the fang and lining the socket (or alveolus) in which it is implanted. This leads to a deposition of new material in the cement till that substance appears in nodular masses attached to or surrounding the apex of each fang, and sometimes uniting several of such fangs into one. The presence of this additional and increasing bulk of hard tissue within the enclosing socket produces pain of a severe and somewhat anomalous character by pressure on the adjacent nerves, which is often mistaken for neuralgic or tic of a less unaccountable origin. It further acts within the unyielding bony socket referred to as a means of rendering removal of the tooth much more difficult, owing to the belligerent extremity of the enclosed fang acting like a rivet in its fixation. Generally, however, the teeth in which exostoses occur have been too long the subjects of irritation and decay not to be suspected when obscure pain of a less localized nature exists in their vicinity, and not unfrequently there is found round the necks of teeth or stumps so affected a red and tumbled condition of the gum, sufficiently indicative of the state of matters below to warrant their extraction.

Alveolar abscess, or gum boil, as it is popularly denominated, is a localized infection going on to suppuration, and generally confined to the tissues surrounding the apex of a tooth fang. The pain usually commences with a feeling of tenderness and enlargement or lengthening of the whole tooth. The gum becomes swollen and tender over the whole depth of the root, generally to a greater extent on the outer side of the jaw. The face also becomes swollen, and the glands in the neighbourhood of the jaw feel enlarged and tender. The pain is not commonly continuous, but rather remitting in its character, sometimes ceasing altogether—only, however, to be followed by an increased attack, while its repeated exacerbations might and day lead in many cases to very considerable constitutional disturbance. After a time the purulent matter secreted makes its way to the surface, sometimes finding an escape alongside of or through the pulp cavity of the fang, and very frequently, as the name given to the disease indicates, by puncturing and discharging itself through the gum.

Occasionally, instead of pointing on the surface of the gum, the matter takes a more indirect course and points on the surface of the cheek, bursting and leaving an open sore there which seldom closes until the tooth or stump has been extracted. At an early stage of this disease, local symptoms and other modes of relieving inflammatory action do good, but evacuating the matter by means of incisions or extraction of the offending tooth are the only reliable remedies at a later period.

Deciduous.—What is termed dentition, although in its widest sense properly including the development of the teeth within, as well as their subsequent appearance through, the superimposed tissues, is generally restricted in its application to the latter division of this process, more especially as it occurs in connection with the temporary or milk set, during the period of early infancy. The genus, increment, and evolution of these organs involve so much of what is purely physiological, and would entail the discussion of so many points of a histological nature, that only the latter stages of evolution of the tooth can be referred to here. Regarding this occurrence, the most vague and contradictory opinions have been entertained. Erroneous notions of its nature, and of the exact manner in which to account for many of its phenomena, have been and still are promulgated. A number of affections incident during infancy are set down as clearly attributable to the tooth’s penetration of its inclosing tissues, and considered by many authorities as of every day necessity.
occlusion; while the views advanced with reference to the pathology and treatment of such cases, suppositional or otherwise, are equally variegated and conflicting. The probable solution of the difficulty seems to be that, while evil consequences may in certain instances be traceable to dentition, the frequency and importance of such cases is very much exaggerated.

Extract.—This constitutes the most important operation of a surgical nature falling under the care of the dentist, and is generally called for where the condition of the tooth, from disease or injury, precludes the possibility of saving it by stopping or other means. The operation is also frequently resorted to where the teeth are too crowded in the jaw, or where they are irretrievably misplaced, or where supernumerary members of the series exist and occasion inconvenience. In order to extract any tooth successfully, there is demanded a knowledge of what its configuration normally ought to be, and of the proper instrument to use; and, along with these, the condition to which decay or other disease may have reduced the tooth must be kept in mind while proceeding with the operation.

A tooth in order to its extraction, the part upon which the hold is taken should be sufficiently sound and strong to withstand the force necessary for dislodging the fangs; and to obtain such a hold it is necessary to thrust the grasp of the instrument as far as possible beyond the spot affected by decay. It should then be detached from the walls of its socket in that direction where least resistance is likely to be met. This must be judged of according to circumstances, but in general is indicated by an acquaintance with the anatomy of the structures concerned. After being thus loosened it has merely to be lifted from the jaw to complete the operation. Sometimes a tooth is so firmly secured in the jaw that its own tissue will give way before it will separate from the alveolar cavity in which it is fixed. This is particularly the case in friable teeth; and frequently even in the strongest teeth the root or fangs may be malformed or bent, or secured in such a manner as renders their extraction extremely difficult or altogether impossible by any ordinary means.

The instruments employed in extraction may be divided into those which grasp the tooth between their blades and literally extract or draw it out, such as forceps, and those which apply the dislodging force by acting as a lever in the manner of a crow bar, such instruments being termed elevators, and other instruments required in dental surgery, but one great principle may be laid down with respect to all of them, which applies especially to forceps, and that is that their form should be as simple as possible consistently with fitting and grasping securely the particular tooth they are intended to remove, and with conveniently reaching that part of the mouth in which it is situated.

Regulation of Teeth.—In the extraction of teeth for the purpose of affording space in cases of dental irregularity from overcrowding, it often becomes necessary to remove a healthy organ, and before doing so among the permanent teeth certain questions present themselves for consideration. Unless there be a fair probability of such a step being successful it endangers the loss of two teeth should the originally misplaced one be so objectionable and so unyielding to treatment as to require this: In the temporary set the principal disadvantage connected with the removal of any of their number is when to make room for one permanent tooth two or more temporary ones would require extraction,—as of course space is thus saved at the expense of the second permanent tooth, for which one of the two temporary ones was keeping a place. In this set, however, the objection to removal of any of its series is greatly obviated by the fact that, while the teeth are very soon to be lost at all events, the jaw is increasing in size progressively and room more and more room itself for the incoming second set. And with extraction, in the great majority of instances pressure requires to be applied to the misplaced teeth in order to effect their regulation. This has generally to be continuously kept up for a considerable period, and in many cases requires to be maintained after the teeth have been restored to their natural position in order to keep them there until they seem settled in the new locality. Various forms of what are called regulating plates are used for the purpose of applying pressure in this manner, and may be said generally to consist of a framework fitted and fixed to the adjoining teeth something in the same manner as an artificial set, and calculated to afford a fixed point or fulcrum from which to act on the tooth to be moved.

In disease of the dental tissues it is not always necessary to remove the affected organ; such an extreme measure as this is only called for when other remedial means have failed, or appear hopeless. The chief of all dental diseases demanding the dentist's care is, as has been already stated, that known as caries, or decay. It is this affection directly or indirectly that leads to by far the larger number of extractions performed, but it by no means follows that extraction is the only remedy at our command. Many teeth are extracted which might be saved, and the principal method by which this can be effected is by what is termed stopping, or plugging, or filling the teeth.

Stopping.—The operation of stopping a decayed tooth consists in cleaning out the carious cavity and removing all the softened or disintegrated tissue, and shaping and trimming it so as to reduce it to a form fit for receiving and retaining the material with which it is to be filled up. Along with these proceedings it is in general becomes necessary to diminish the sensitive condition in which the interior surface of the prepared cavity is left, to remove or destroy any of the vascular and highly nervous pulp which may be protruding into it, and to subdue any inflammation and arrest any discharge which may have been going on in the fang. Various means and measures are resorted to for these purposes, the most common being the applying for a time some of the more convenient escharotics on a plug inserted into and left within the cleaned-out cavity till this end is achieved. When thus prepared, the cavity is ready to be filled with whatever substance has been selected to replace the lost tissue, and as nearly as possible to restore the contour of the tooth. The substances employed as permanent stoppings are generally metallic. Gold in the form of foil, or in that condition known as sponge gold, tin in the form of foil, and amalgams composed of various metals either in a simple or compound condition combined with mercury, and the principal matters in use as stoppings. The oxycarbons, from their being capable of insertion in a plastic state, and quickly acquiring a density and hardness approaching that of tooth bone, are also favourites with many as serviceable fillings; and various preparations of gutta-percha, gum resins, sulphur, and other matters have long been known as valuable, though not very durable, when employed in certain cases.

Dexterity in the insertion of a gold or other foil filling is a matter which can be acquired by experience alone. The general principles are that, the cavity being prepared and
The jaw, gum, and teeth being then considered as in a suitable condition, the first step in the process is to obtain a plaster cast of the parts,—"the model," as it is termed. This is done by pressing softened beeswax or some similarly plastic composition against them until they are imbedded and leave an impression in it, giving an exact mould of the gums, remaining teeth, and all other parts on its removal. Plastic of Paris is now run into the mould so obtained, and when set is hardened a perfect facsimile of the structures to be fitted is the result.

Any further proceedings now depend upon the mode and material in which the future artificial set is to be constructed. Every set of artificial teeth consists of representatives of the lost organs, modelled in a species of porcelain, and mounted upon a base adjusted to the gum and remaining natural teeth. This base is manufactured in a variety of materials, the principal of which are—(1) metal plate, of gold, platinum, silver, or different alloys, (2) vulcanized caoutchouc, or vulcanite, as it is called, and (3) celluloid base, a composition of collodion and camphor, which has not been long enough tested to yet rank with the other substances, while (4) the teeth may be mounted merely with as much extraneous material as will support a pin or pivot by which they may be attached as new crowns to a root in which such pivot is firmly inserted. When it is intended that the base shall be of gold or other plate, a metal die and counter have to be made from the plaster model, between which the plate is embossed, and the requisite form obtained. The die and counter die are generally made the one in zinc or gun metal, the other in lead or tin, and,—unlike the dies from which jewellery patterns, &c., are embossed, and which may serve for thousands of times,—the dental die having served to emboss the plate for one patient, is of no further use for any other case. The plate being thus far advanced next requires to be adjusted to the mode in which the patient closes the opposing jaw or teeth against it in shutting the mouth,—in other words, the "bite" has to be taken, and the artificial teeth, which are to be mounted on the plate, arranged accordingly. Any fastenings supporting or steadying the set have also to be adjusted, and after this, if everything has gone well, the false set should be ready for placing in its destined locality and for use by the patient.

Should it be proposed to make the base of vulcanite, celluloid base, or a similar material, a different mode of procedure must be adopted. These materials necessitate a greater bulk of substance occupying the mouth than is the case where metal plate is employed. This, however, is in some cases an advantage—since, for instance, where the gum has been greatly diminished in size through absorption, it requires some bulk of material to restore the parts to their normal size, and to give the former natural expression to the features. In preparing a vulcanite base no metal die is necessary. The base is built up in wax directly on the plaster model, and the porcelain teeth adjusted in their places, the bite and attachments being carefully attended to, as described in speaking of plate cases. The set thus made up, and presenting the exact counterpart of what the finished work is intended to be, is now, after testing it and finding it correct and perfect in the mouth, imbedded in Paris plaster as follows. A small box, or "flask," as it is denominated, of iron or other metal, like one saucer inverted on the top of another, is opened and the model with the wax-built set is placed in the lower saucer, which is then filled up with plaster to the level of the wax set. This being allowed to harden is soaked or oiled all over its surface, and the lid of the flask, or what corresponds to the upper saucer, is now placed upon the under portion of the flask. An opening in this covering portion enables plaster to be next poured into it till the imbedded
wax-mounted set is shut up like a fossil in the heart of its stony covering. On the two halves of the flask being separated, the set of course remains firmly secured in the lower portion. Boiling water is now poured over it, and the wax thus melted out, leaving the porcelain teeth undisturbed and in situ. A cavity is thus left when the two sides of the flask are again closed, representing exactly the form of the wax removed. Raw vulcanite, or whatever other material of the kind is to be used, is now introduced within the space thus left by the removal of the wax. The two sides of the flask are next brought together and maintained there by the pressure of a clamp and screw. The whole is then placed in a vessel termed a calciner, where it is subjected, for the space of from an hour and a quarter to two hours or more, to the action of steam at a temperature ranging up to 320° Fahr., at the end of which time the piece will be found hard and ready for finishing and polishing as may be desirable. In firing and manipulating the collodion base some modification of this process is required, but as yet the substance is comparatively little used, and would scarcely justify further remark in this place.

What is termed a pivot tooth, again, is an artificial tooth having a metal or sometimes a wooden pin firmly attached to it, and this being inserted into the opened pulp cavity of a healthy fang, the artificial forms a secure and very perfect substitute for the original crown when the tooth having comparatively little used, and would scarcely justify further remark in this place.

It is not an uncommon thing to find a man's death caused by falling from a cart or a horse at rest; and if a horse or other animal in motion killed a person, whether infant or adult, or if a cart run over him, it was forfeited to the king for pious uses. Blackstone, while tracing the custom an expiatory design, alludes to analogous Jewish and Greek laws, which required that what occasions a man's death should be destroyed. In such usages the notion of the punishment of an animal or thing, or of its being morally affected from having caused the death of a man, seems to be implied. The forfeiture of the offending instrument in no way depends on the guilt of the owner. The imputation of guilt to inanimate objects or to the lower animals, repugnant as it is to our habits of thought, is not inconsistent with what we know of the ideas of uncivilized races. In English law, deodands came to be regarded as mere forfeitures to the king, and the rules on which they depended were not easily explained by any key in the possession of the old commentators. The law distinguished, for instance, between a thing in motion and a thing standing still. If a horse or other animal in motion killed a person, whether infant or adult, or if a cart run over him, it was forfeited as a deodand. On the other hand, if death were caused by falling from a cart or a horse at rest, the law made the chattel a deodand if the person killed were an adult, but not if he were a person below the years of discretion. Blackstone accounts for the greater severity against things in motion by saying that in such cases the owner is more usually at fault, an explanation which is doubtfully in point of fact, and would certainly not account for other instances of the same tendency. Thus, where a man's death is caused by a thing not in motion, that part only which is the immediate cause is forfeited, as "if a man be climbing up the wheel of a cart, and is killed by falling from it, the wheel alone is a deodand," and Blackstone, having said that the cart were in motion, not only the wheel but all that moves along with it (as the cart and the loading) are forfeited. A similar distinction is to be found in Britton. Where a man is killed by a vessel at rest the cargo is not deodand; where the vessel is under sail, hull and cargo are both deodand. For the distinction between the death of a child and the death of an adult Blackstone accounts by suggesting that the child was presumed incapable of

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1 Compare also the rule of the Twelve Tables, by which an animal which had inflicted mischief might be surrendered in lieu of compensation.
actual sin, and therefore needed no deodand to purchase
propitiatory masses; but everv adult who died in actual sin
stood in need of such atonement, according to the humane
superstition of the founders of the English law." Sir
Matthew Hooke’s explanation was that the child could not
take care of himself, whereas Blackstone asks why the
owner should save his forfeiture on account of the
imbécility of the child, which ought to have been an additional reason
for caution. The finding of a jury was necessary to con-
stitute a deodand, and the investigation of the value of the
instrument by which death was caused occupies an
important place among the provisions of our early criminal
law. It became a necessary part of an indictment to state
the nature and value of the weapon employed—so that the
stroke was given by a certain pinkknife, of the value of
suxence—so that the King might have his deodand.
Accidents on the high seas did not cause forfeiture, being
beyond the domain of the common law, but it wouldappear that in the case of ships in fresh water, the law as
quoted above from Button a priori held good. The King might
grant his right to deodands to another.
In later times these forfeitures, so unintelligible in their
purpose, so capricious and unjust in operation, became
extremely unpopular; and juries, with the connivance of judges, found deodands of trifling value, so as to defeat
the inequitable claim. But deodands were not abolished
till the 9 and 10 Vict. c. 62 was passed, whereby it is
enacted that "there shall be no forfeiture of any chattel
for or in respect of the same having caused the death of a
man; and no coroner’s jury sworn to inquire, upon the
sight of any dead body, how the deceased came by his
death, shall find any forfeiture of any chattel which may have
moved to or caused the death of the deceased, or any
deodand whatsoever, and it shall not be necessary in any
indictment or inquisition for homicide to allege the
value of the instrument which caused the death of the deceased,
or to allege that the same was of no value." The date of
this Act (1840) may suggest the great inconvenience which
the law, if it had remained in operation, would have caused
to railway and other enterprise in which loss of life is a
frequent occurrence.

DEPRES, Josquin (1440–1519), also called Despres, and
by a Latinized form of his name, Jodocus Pratesanus or a
Prato, a celebrated musical composer, was born about 1440
at Vermand, near St Quentin, in French Flanders. He was
a pupil of Ockenhelm, the great contrapuntist, and himself one of the most learned musicians of his time. In spite of his
wealth, his character was noted for its poverty and frugality, and even the place of his birth has only lately been
established beyond dispute—Belgians, Germans, Italians,
and Frenchmen claiming him as their countryman. M
Fétis, the well-known historian of music, has contributed
greatly towards elucidating the doubtful points, and to
that author’s Biographie Universelle, the reader is referred
for more detailed information.
In his early youth Josquin seems to have been a member of the choir of the collegiate
cathedral of St Quentin, where his voice changed for the
first time (about 1458) to Ockenhelm to take lessons in counter-
point. From 1470 to 1480 he lived at his birthplace for some years, till Pope Sixtus IV. invited him to Rome to teach his
art to the musicians of Italy, where musical knowledge at that
time was at a very low ebb. In Rome Depres lived till the
death of his protector (1484), and it was there that many of his works were written. His reputation grew rapidly, and
he was considered by his contemporaries to be the greatest
master of his age. Luther, himself an excellent musical
amateur, is credited with the saying that "other musicians
do with notes what they can, Josquin what he likes." The
composer’s journey to Rome is itself a most important event in the history of musical progress, for it marks in a
manner the transference of the art from its Gallio-Belgian
birthplace to Italy, which for the next two centuries
remained the centre of the musical world. To the
school of the Netherlands, of which Depres and his
api, Aernoul, Mouton, and others are the chief repres-
entatives, modern music owes its rise, and it is
important than this school itself was its outgrowth and
successor, the so-called Roman school, immortalized by
the name of Palestrina. After leaving Rome Depres went
to a time to Ferrara, where the art-loving duke Hercules
I offered him a home, but before long he accepted an
invitation of King Louis XII. of France to become the chief
singer of the royal chapel. According to another account,
he was for a time at least in the service of the emperor
Maximilian I. The date of his death has by some
writers been placed as early as 1501. But this is suffi-
ciently disproved by the fact of one of his finest com-
positions, A Dirge (Diplusum) for Five Voices, being
written to commemorate the death of his master Ocken-
heim, which took place after 1512. The real date of
Josquin’s death has since been settled as the 27th
August 1521. He was at that time a canon of the
cathedral of Coné. The most complete list ofDepres’s com-
positions—consisting of masses, motets, psalms and
other pieces of sacred music—will be found in Fitz’s
The largest collection of his MS. works, containing no less than 20 masses, is in the possession of the Royal
chapel in Rome. The well-known works by Drye Bury-
ney and Hawkins give specimens of his music

DEPTFORD, a town of England situated at the junction
of the Ravensbourne with the Thames, 83 miles east
of London Bridge. It forms the western portion of the
parliametary borough of Greenwich, occupying an area
of about 1650 acres, situated mostly in the county of Kent,
and partly in Surrey. It comprises two parishes—that
of St Nicholas, including Lower Deptford on the Thames,
and St Paul’s, or the landward part of the town, which
extends into Surrey and includes Hatcham Manor. Lower
Deptford consists of irregular narrow streets, and the
houses are mostly of a mean description. It contains
the site of the old dockyard, and the royal victualling yard
is also situated there. The former was discontinued as a
dockyard in 1689, it was filled up and converted into a
foreign cattle market by the corporation of London, but
was given up in 1873. The victualling yard immediately
was occupied by the establishment of its kind in the kingdom, supplying the navy with provisions, medicines, furniture, etc., which are manufac-
tured or stored in the large warehouses that constitute
the establishment. As many as 500 hands are employed in
the warehouses and at the lading wharf. The only other
industry which employs importance in the place is the
engineering works, which are carried on near the
river. Of public buildings the most noteworthy are St
Nicholas Church, with a square embattled tower, built
on the site of an older structure at the beginning of the last
century, and St Paul’s, of classic design, erected in 1739.
There is also the hospital for master mariners, maintained
by the corporation of the Trinity House, which was
originated here. Of the mansion known as Sayes Court, with
which Deptford is historically identified, nothing now remains but the garden. The house—taken down in 1729—
was the residence of the Duke of Saxe Coburg, and for
the last time in England in 1698. The popula-
tion of Deptford in 1871 amounted to 60,188 persons,
sixty-eights being in the landward parish, and forty-two
in the river parish.

DE QUINCEY, Thomas (1785–1859), an eminent
English author, was born at Greenhay, near Manchester,
on the 15th of August 1785. He was the fifth child in a family of eight (four sons and four daughters), of whom three died young. His father, descended from a Norman family, was an opulent merchant, who lived much abroad, partly to look after his foreign engagements, but mainly from considerations of health; he died of pulmonitis in the third year of his age, leaving his wife and six children a clear income of £1600 a year. The widow, a woman of exceptional talent, secured to her family the enjoyment of those social and educational advantages which their position and means afforded.

Thomas was from infancy a shy, sensitive child, with a constitutional tendency to dreaming by night and by day, and, under the influence of an elder brother, a lad “whose genius for mischief amounted to inspiration,” who died in his sixteenth year, he spent much of his boyhood in imaginary worlds of their own creating. The amusements and occupations of the whole family, indeed, seem to have been mainly intellectual; and in De Quincey’s case, emphatically, “the child was father to the man.” “My life has been,” he affirms in the Confessions, “on the whole the life of a philosopher; from my birth I was made an intellectual creature, and intellectual in the highest sense my pursuits and pleasures have been.” From boyhood he was more or less in contact with a polished circle; his education, easy to one of such native aptitudes, was exclusively attended to. When he was in his twelfth year the family removed to Bath, where he was sent to the grammar school, at which he remained for about two years; and for a year more he attended another public school at Winklefield, Wiltshire. At both his proficiency was the marvel of his masters.

At thirteen he wrote Greek with ease; at fifteen he not only composed Greek verses in lyric measures, but could converse in Greek fluently and without embarrassment; one of his masters said of him, “that boy could harangue an Athenian mob better than you or I could address an English one.” Towards the close of his fifteenth year he visited Ireland, with a companion of his own age, Lord Westport, the son of Lord Altamont, an Irish peer, and spent there in residence and travel some months of the summer and autumn of the year 1800,—being a spectator at Dublin of “the final ratification of the bill which united Ireland to Great Britain.” On his return to England, his mother having now settled at St John’s Prory, a residence near Chester, De Quincey was sent to the Manchester grammar school, mainly that it might be easier for him to get thence to Oxford through his obtaining one of the school exhibitions.

Discontented with the mode in which his guardians conducted his education, and with some view apparently of forcing them to send him earlier to college, he left this school after less than a year’s residence, ran away, in short, to his mother’s house. There one of his guardians made an arrangement for him to have a weekly allowance, on which he might reside at some country place in Wales, and pursue his studies, presumably till he could go to college. From Wales, however, after brief trial, “suffering grievously from want of books,” he went off as he has done from school, and hid himself from guardians and friends in the world of London. And now, as he says, commenced “that episode, or impassioned parenthesis of my life, which is comprehended in The Confessions of an English Opium Eater.” This London episode extended over a year or more, at the end of which the lad was removed to his guardians, and in 1803 went to Oxford, being by this time about nineteen. It was in the course of his second year at Oxford that he first tasted opium,—having taken it to allay neuralgic pains. After finishing his career of five years at college in 1808, he ultimately settled in 1812 to the life of a student on the borders of Grasmere, drawn thither partly by neighbourhood to Wordsworth, whom he early appreciated,—having been, he says, the only man in all Europe who quoted Wordsworth so early as 1803. Here also he enjoyed the society and friendship of Coleridge, Wilson, and Southey, as in London he had of Charles Lamb and the boldest circle.

He continued his classical studies, especially exploring the at that time almost unknown region of German literature, and indicating its riches to English readers. Here also, in 1816, he married the “dear M,—” of whom a charming glimse is accorded to the reader of the Confessions, his family came to be five sons and three daughters. For a year he edited, at Kendal, the Westmorland Gazette. He resided till the end of 1820 at Grasmere, afterwards in London, and latterly at Lasawde near Edinburgh, or in Edinburgh. He died in that city December 8, 1859, aged seventy-four, and is buried in the West Churchyurd.

During nearly fifty years De Quincey lived mainly by his pen. His patrimony seems never to have been entirely exhausted, and his habits and tastes were simple and inexpensive, but he was careless to recklessness in the use of money, and debts and pecuniary difficulties of all sorts hung about him through the greater part of his life. There was, indeed, his associates affirm, an element of romance even in his impecuniosity, as there was in everything he said or did. His habits and tastes were entirely exhausted, and his habits and tastes were converted annoyance into amusement. The famous Confessions of an English Opium Eater, having first appeared in The London Magazine, were published in a small volume in 1820, and attracted a very remarkable degree of attention, not simply from their disclosures as to his excessive use of the drug, and its effects, but also by the marvellous beauty of the style of the work, its romantic episodes, and extraordinary power of dream-painting. All De Quincey’s other writings appeared in periodicals—Blackwood’s Magazine, Tat’s Magazine, Hog’s Instructor, &c. No other literary man of his time, it has been remarked, achieved so high and universal a reputation from such merely fugitive efforts. Since his works were brought together, that reputation has been not merely maintained, but extended. The American edition was published in this country in 1853, under the author’s own supervision, and expanded to fourteen volumes; upon his death two more volumes were made up of previously uncollected material. For range of thought and topic, within the limits of pure literature, no like amount of material of such equality of merit has proceeded from any eminent writer of our day. However profuse and discursive, De Quincey is always polished, and generally exact—a scholar, a wit, a man of the world, and a philosopher, as well as a genius. He looked upon letters as a noble and respectable calling; in his essay on Oliver Goldsmith he claims for literature the rank not only of a fine art, but of the highest and most potent of fine arts; and as such he himself regarded and practised it.

He drew a broad distinction between “the literature of knowledge and the literature of power,” asserting that the function of the first is to teach, the function of the second to move,—maintaining that the meanest of authors who moves has pre-eminence over all who merely teach, that the literature of knowledge must perish by supersession, while the literature of power is “triumphant for ever as long as the language exists in which it speaks.” It is to this class of motive literature that De Quincey’s own works essentially belong; it is by virtue of that vital element of power that they have emerged from the rapid oblivion of periodicalism, and live in the museums of a second generation.
of readers and admirers, as they are safe to do in those of
a third and fourth. The risk of their not reaching on
through succeeding time arises from their diffuseness—their
power as weakened by their volume.

De Quincey has fully defined his own position and
class to distinction in the preface to his collected works.
These he divides into three classes—"first, that class
which proposes primarily to amuse the reader," such as the
Narratives, Autobiographical Sketches, &c.; "second,
papers which address themselves purely to the under-
standing as an unsalted faculty, or do so primarily," such
as the essays on Escaim, the CaeSars, Cicerio, &c.; and
finally, as a third class, "and, in virtue of their aim,
as a far higher class of compositions," he ranks those
"modes of impassioned prose ranging under no prece-
dents that I am aware of in any literature," such as the
Confessions and Surpriso de Profunda. The high claim
here asserted has been so far questioned, and short and iso-
lated examples of eloquent apostrophe, and highly-wrought
imaginative description, have been cited from Rousseau
and other masters of style, but De Quincey's powers of
sustaining a fascinating and elevated strain of "impassioned
prose" is allowed to be entirely his own. In this his genus
most emphatically asserts itself, if it be not admitted that in
that divined circle some durst walk be, he will be without
hesitation conceded that there he moves supreme. Nor, in
regard to his writings as a whole, will a minor general claim
which he makes be disallowed, namely, that he "does not
write without a thoughtful consideration of his subject,"
and also with novelty and freshness of view. "Generally,
he says, "I claim (not arrogantly, but with firmness) the
right of rectification applied to absolute errors, or to in-
rigorous limitations of the truth." Another obvious quali-
ity of all his genus is its overflowing fulness of allusion
and illustration, recalling his own description of a great
philosopher or scholar.—Not one who depends simply on
an infinite memory, but also on an infinite and electrical
power of combination, bringing together from the four
winds, like the angel of the resurrection, what else were
dust from dead men's bones into the unity of breathing
life." It is useless to complain of his having lavished and
diffused his talents and acquirements over so vast a variety
of often comparatively trivial and passing topics, instead of
concentrating them on one or two great subjects
The world must accept gifts from men of genius as they
offer them; circumstances and the hour often rule their
fate. Those influences, no less than the idiosyncasy of the
minds, of the QuinCey and De Quincey, to the illumination
of such matter for speculation as seemed to be before him,
he was not careful to search out receipts or occult themes,
thoroughly he did not neglect—a student, a scholar, and
a recluse, he was yet at the same time a man of the world,
keenly interested in the movements of men and in the page
of history that unrolled itself before him day by day. To
the discussion of things new, as readily as of things old,
aided by a capacious, retentive, and ready memory, which
dispensed with reference to printed pages, he brought
also the exquisite keenness and subtlety of his highly
analytic and imaginative intellect, the illustrative power
of his vast and varied education, and that large infusion
of common sense which preserved him from becoming at
any time a mere doctrinar, or visionary. If he did not throw
himself into any of the great popular controversies or
gitations of the day, it was not from any want of
sympathy with the course of modern life or the progress
of the race, but rather because his vocation was to
apply such incidents of his own time, as to like incidents
of all history, great philosophical principles and tests of truth
and power. In politics, in the party sense of that term, he
would probably have been classed as a Liberal Conservative
or Conservative Liberal—at one period of his life perhaps
the former, and at a later the latter. Originally, as we
have seen, his surroundings were somewhat aristocratic,
in his middle life his associates, notably Wordsworth,
Huth, Southey, and Wilson, were all Tories, but he seems
never to have held the extreme and narrow views of that
circle. Though he had a passion for running through
his writings, he has no vulgar sneers at the vulgar. As he
advanced in years his views became more and more
decidedly liberal, but he was always as far removed from
Radicalism as from Toryism, and may be described as a
philosophical political, capable of classification under no
definite party name or colour. Of political economy he
had been an early and earnest student, and projected, if he
did not so far proceed with, an elaborate and systematic
treatise on the science, of which all that appears, however,
are his fragmentary Dialogues on the system of Ricardo,
which John Ramsay McCulloch pronounces "unequaled
for brevity, pungency, and force." But political and eco-
nomic problems largely exercised his thoughts, and his
historical sketches show that he is constantly alive to
their interpenetrating influence. The same may be said
of his biographies, notably of his remarkable sketch
of De Pari. Neither politics nor economics, however,
exercised an absorbing influence on his mind,—they were
merely provinces in the vast domain of universal specula-
tion through which he ranged "with unconfined wings,"
wide and varied was the region he traversed a glance at
the titles of the papers which make up his collected—or
more properly selected—works (for there was much matter
of evanescent interest not reprinted) sufficiently shows
He was equally at home in all provinces, though never
exercising his great powers so as to make himself paramount
in any. Surprising as his literary achievements are, his
capabilities were still greater; and the general survey leaves
the impression of regret that, doing so much so well, he did
not do more, or did not less better. Some things in his
own line he has done perfectly, he has written many pages
of magnificently mixed argument, irony, humour, and elo-
quence, which, for sustained brilliancy, richness, subtle force,
and purity of style and effect have simply no parallels, and
he is without peer the prince of dreamers. The use of opium
no doubt stimulated this remarkable faculty of reproducing
in skilfully selected phrase the grotesque and shifting
forms of that "cloudland, gorgeous land," which opens to
the sleep-closed eye; but the faculty itself was a speciality
of his constitution, coloured by the quality of his genius,
and enriched by the acquisitions of his intellect.

To the appreciation of De Quincey the reader must bring
an imaginative faculty somewhat akin to his own—a cer-
tain general culture, and large knowledge of books, and men,
and things. Otherwise much of that slight and delicate
allusion that gives point and colour and charm to his
writings will be missed, and on this account the full
enjoyment and comprehension of De Quincey must always
remain a luxury of the literary and intellectual. But his
skill in narration, his rare pathos, his wide sympathies,
the pomp of his dream-descriptions, the exquisite playfulness
of his lighter dissertations, and his abounding though deli-
cates and subtle humour, commend him to a larger class.
Though far from being a professed humourist—a character
he would have shrunk from—there is no more expert
worker in a sort of half-veiled and elaborate humour
irony than De Quincey; but he employs those resources
for the most part secondarily. Only in one instance has
he given himself up to them unrestrainedly and of set
purpose, namely, in the famous Essay on Murder considered
as one of the Fine Arts,—an effort which, admired and ad-
orable though it be, is also, it must be admitted, somewhat
strained. He was a born critic and dreamer, a
logician by instinct and culture, a student by choice, a
scholar by right of conquest of the stores of many minds, a
writer of English of the first quality by dint of native
command of language and life-long study and practice.
His style, full and flexible, pure and polished, as peculiarly
his own; yet it is not the style of a manneater,—its charm
is, so to speak, latent; the form never obtrudes; the secret
is only discoverable by analysis and study. It consists
simply in the reader's assurance of the writer's com-
plete mastery over all the infinite applicability and re-
sources of the English language. Hence involutions and
parentheses, "cycle on epicycle," evolve themselves into
a stately clearness and harmony, and sentences and
paragraphs, loaded with suggestion, roll on smoothly and
musically, without either
paragraphs, loaded with suggestion, roll on smoothly and
musically, without either
familiarly more or less elevated sense of the
woman, and child,—looking on himself as a catholic
creature standing in an equal relation to high and low,
and with equal freedom of expression. He was a
peasant lad or a servant girl in phrase as choice, and
sentences as sweetly turned, as if his interlocutor were
his equal both in position and intelligence; yet with-
out a suspicion of pedantry, and with such complete
adaptation of style and topic that his talk charmed
the humblest as it did the highest that listened to it. His
conversation was not a monologue; if he had the larger
share, it was simply because his hearers were only too glad
that it should be so; he would listen with something like
defERENCE to very ordinary talk, as if the mere fact of
the speaker being one of the same company entitled him to
all consideration and respect. The natural bent of his
mind and disposition, and his life-long devotion to letters,
to say nothing of his opium eating, rendered him, it must be
allowed, regardless of ordinary obligations in life—domestic
and pecuniary—to a degree that would have been not only
culpable, but very highly so, in any less singularly con-
trasted mind. It was impossible to deal with or judge
De Quincey by ordinary standards—not even his publishers
did so. Much no doubt was forgiven him, but all
that needed forgiveness—and, after all, his sins were rather
of omission than commission, trival rather than honour,
trying rather than deadly,—will soon be covered by the
kindly obvious veil of lapsing time, while his merits as a
master in English literature will remain to be gratefully
acknowledged.

A collection of De Quincey's works was published by James Hogg
and Sons, Edinburgh, in 14 volumes, 1856-1860; and the same
edition was reprinted by A. & C. Black, Edinburgh, with altera-
tions and additions, in 16 volumes, 1862-1871. An American
edition, issued by Ticknor & Fields, Boston, 1859-1865, extends
to 20 disconnected volumes. A biography in two volumes, by
H. A. Page, Thomas De Quincey, His Life and Writings, has been

DERA GHAZI KHAN, a district of British India, in the
Durajti division of the lieutenant-governorship of the
Punjab, is situated between 28° 27' 0" to 31° 1' 0" N.
lat. and 69° 36' 30" and 70° 58' 20" E. long. It is
bounded on the N. by Dera Ismail Khan, on the E. by
the Indus, on the S. by Jacobabad in Sind, and on the W by
the Bulkanan range of hills. The district is a long narrow
strip of country, 198 miles in length, sloping gradually
from the hills which form its western boundary to the
River Indus on the east. Below the hills the country is
high and arid, generally level, but sometimes rolling in
sand banks, and much intersected by hill torrents, 201
in number. With the exception of two, these streams
dry up after the rains, and their influence is only felt for
a few miles below the hills. The eastern portion of the
district is at a level sufficiently low to benefit by the floods
of the Indus. A barren tract intervenes between these
zones, and is beyond the reach of the hill streams on the
one hand and of the Indus on the other. Although liable
to great extremes of temperature, and to a very severe
rainfall, the district is not unhealthy. The rainfall in
1872-73 was 77 inches; the mean temperature 79° Fahr.
The maximum temperature (112°) occurred in June, the
minimum (40°) in December. The principal agricultural
products are wheat, great millet, yoder, cotton, rice, and
indigo. The poppy plant is also rather extensively cul-
tivated in the south of the district. The less important food
grains are barley, spiced millet (bhird), and pulses. Oil
seeds and tobacco are also grown to a small extent.

1 The area of the district is returned at 4050 square miles, or
3,165,500 acres, of which 2,412,749 acres were under assessment
in 1872-73. The cultivated area amounts to 1602 square miles, or
1,065,600 acres, or 33.5 per cent of the total area; the irrigated
area 497,599 acres, or 49.54 per cent, are irrigated. The first
large settlements of the district were made in 1872.
cultivation mainly depend upon artificial irrigation, effected principally by canals leading from the Indus. In 1872-73 there were 15 main canals, drawing their supply direct from the Indus, of which 2 were the property of private individuals, and 13 were under the management of Government. Alum, earth salt, and sugar (an impure carbonate of soda) are manufactured in some quantities. The exports are indigo, opium, salt, dates, wheat, cotton, barley, millet, saik, and hides. The imports are sugar, fruits from Cabul, grain, woollen goods, English piece goods and broad cloth, metal tools, salt, and spices. The total revenue of the district in 1872-73, exclusive of local funds and canal collections, amounted to 245,161, of which £35,588, or 79 per cent., was derived from the land. The administrative staff of the district consists of a deputy commissioner, with two assistants and one extra assistant, four subordinates, each with a deputy or assistant, a district superintendent of police, and two civil surgeons. The police force numbered 733 men. There are 35 schools, maintained or assisted by the State, and 132 indigenous villages schools—total 167, attended in 1872-73 by 2907 pupils. Three charitable dispensaries afford gratuitous medical relief. The principal town of the district, and chief seat of commerce, is Derá Ghází Khan, situated on the west bank of the Indus, 30° 4' lat., 70° 51' long. Population in 1868—Mahometans, 10,699; Hindus, 8800, Sikhs, 328; Christians, 52, "others," 194—total, 20,123. The other towns containing a population exceeding 5000 souls are Jânpur, population 7790; Chott, population 7300; Dâghî, population 5693; and Râjanâ, population 5696. Jânpur, although not containing 5000 inhabitants, is important as a cantonnement, a regiment of cavalry and two companies of infantry being stationed there. The foregoing towns are all municipalities.

The census of 1868 returned the population as follows—Mahometans, 284,527, Hindus, 38,467, Sikhs, 1124, "others," 4722, total 339,544. The Beluchis, who are Mahometans, form by far the most important section of the population, and number 322,560. The Juts, who are also Mahometans, are the most numerous, numbering 162,519. Among the Hindu population, the Arorâs form the most important caste, 85,664 in number, principally traders. Of the total population, 194,769, or 59 per cent., are returned as agriculturists.

DERÁ ISMAIL KHÁN, a district of British India in the Derádût division of the lieutenant-governorship of the Punjab, is situated between 30° 35' 30" and 32° 35' 0" N lat., and 70° 15' 0" and 70° 15' 30" E.E long. It is bounded on the N. by the district of Bannu, on the E. by Shâhpur and Jhang, on the S. by the Musaffârgâh and Derá Ghází Khan, and on the W. by the Sullivanahân hills, beyond which is the territory of the Khan of Kohât. The district is divided into two almost equal portions of the Indus, which intersects it from north to south, and is the only river of any importance. To the west of the Indus, the characteristics of the country resemble those of Derá Ghází Khan. To the east of the present bed of the river there is a wide tract known as the Kaâh, exposed to river action. Beyond this, the country rises abruptly, and a barren, almost desert plain stretches eastwards, thinly cultivated, and inhabited only by nomadic tribes of herdsmen. The area of the district is 7056 square miles, or 4,541,900 acres; the cultivated area amounts to 641,913 acres, of which 426,004 acres are under irrigation, and 115,009 unirrigated. The uncultivated area, which is returned at 3,999,887 acres, is subdivided as follows—grazing lands, 564,864 acres, cultivable, but not actually under cultivation, 1,529,756 acres; uncultivable, 3,999,887 acres. The district has recently been granted a regular land settlement for the first time. The period of the latest settlement expired in 1871 in part of the district, and in 1874 in the remainder. The principal agricultural products are wheat, barley, grain, peas, tobacco, and oilseeds for the spring or robi harvest, and rice, millets, and cotton for the autumn or kharif crop.

There are no manufactures of importance. The principal municipal towns, with their populations (1865), are as follows—Derá Ismail Khan, the civil station and chief town, population 24,906; Led, 17,033; Kolachi, 9921; Takhwârâ, 6800; Karor, 5720; Bhâkkâr, 5584; Pannâma, 5502. Other minor towns, which are also municipalities, are Kot Sultân, Mânkâla, and Tânak. The income of the district in 1872-73 (exclusive of municipal taxation) amounted to £50,918, of which £39,784 was derived from the land. The police force consisted of 617 men. There were 18 Government or aided and 87 indigenous village schools in 1872-73, attended by 2190 pupils. The census of 1868 returned the population as follows—Mahometans, 338,887, Hindus, 48,756, Sikhs, 1587, others, 619, total 394,694. Of the Mahometan population, the principal classes are the Beluchis, 34,703 in number, Pathans, 54,812, and Sayyids, 8669. The Hindus consist almost entirely of Hindus, 264,877, Maorits and Hindu tenants. Of the total population, 187,096, or 48 per cent., are returned as agriculturists.

DERÂJAT, a division or commissionership of British India, under the jurisdiction of the lieutenant-governor of the Punjab, comprising the frontier districts of Derá Ghází Khan, Derá Ismail Khan, and Bannu, situated between 25° 30' and 33° 15' N lat. and 70° 15' 0" and 70° 15' 30" E.E long. The division is bounded on the N. by the district of Kohât, on the E. by the districts of Rawal Pindi, Shâhpur, and Jhang, and by the River Indus, on the S. by the district of Jacobabad in Sind, and on the W. by the Wazir and Sullivanahân hills, beyond which is the territory. The two northern districts of the division, Bannu and Derá Ismail Khan, are intersected by the Indus. The Bannu valley is drained by the Kuram and Gambla rivers. It is shut in on the N. and S. by hills, and is traversed from N. to S. by a continuation of the great Punjab salt range. According to the census of 1868, the Derâjat division comprises an area of 14,432 square miles, with a population of 901,251 souls, inhabiting 1669 villages, classified as follows—Mahometans, 863,464, or 87 per cent.; Hindus, 113,445, or 11 per cent.; Christians, 253, Sikhs, 258, or 3 per cent.; and "others," 7169, or 1 per cent.

DâRDEMB, or Dabrant, a town of Russin, in the government of Daghestan, on the western shore of the Caspian, about 170 miles E.N.E. of Tbilî, in 43° 4' N lat. and 47° 53' E long. It occupies a narrow strip of land lying between the sea and a mountain range of moderate elevation, which is crowned by the citadel, or tower Kale, and on all sides except towards the east, where it projects into the water, it is surrounded by strong walls built of porous limestone. Its general aspect is decidedly Oriental, owing to the flat roofs of its two-storied houses. Besides the governor's residence, which stands in the neighbourhood of the citadel, the town possesses a fine Russian church, 3 Jewsiah synagogues, 17 mosques (including one belonging to the Sunni sect), 3 bazaars, and a number of caravansaries. The upper part of the town is supplied with water from a reservoir in the citadel, fed by a fountain in the mountain behind, but the Darb, or lower town along the shore, communicates by an aqueduct with the Rubas-Chai, a small river to the south. The environs are occupied by vineyards, gardens, and orchards, in which madder, saffron, and tobacco, as well as figs, peaches, apricots, and other fruit are cultivated. The madder is a valuable export, and the saffron is in high repute. Earthenware, weapons, and silk and cotton fabrics, are the principal products of the manufacturing industry. To the north of the town is the monument of the Kîrb Lâr, or Forty Holy men, whose name is commemorated in Arabic inscriptions; and to the south lies the seaward extremity of the great Derbend or Caucasian wall, otherwise known as...
Said-Eskender, or Alexander’s wall, which, while still entire, had a height of 29 feet and a thickness of about 10, and with its iron gates and numerous watch towers formed a valuable defence of the Persian frontier. Derbend is a place of great antiquity, and is usually identified with Albania, the capital of the ancient Albania. The modern name, which is the Persian word for a gateway, probably came into use about the end of the 6th or the beginning of the 7th century, when the city was re-founded by Kobod of the Sassanid dynasty. The walls and the citadel are believed to belong to the time of Kobodi’s son, Nushirvan Cheerooe. In 728 the Arabs entered into possession, and established a khannate in the city, which they called either Bab-al-alwah, “the principal gate,” Bab-al-Khadid, “the iron gate,” or Seri-el-Dagab, “the golden throne.” The celebrated caiaph, Haroun-al-Rashid, lived in Derbend at different times, and brought it into great repute as a seat of arts and commerce. In 1220 it was captured by the Mongolians, and in the course of the succeeding centuries it frequently changed masters. In the reign of Perder Ivanovitch, the Persian Government promised to make it over to Russia in reward for assistance against the Turks, but the surrender was never completed. In 1722 Peter the Great took advantage of the disturbances in Persia, seized the town, established a garrison, and intrusted the government to Imam Kuli-Beg, but in 1733 the supremacy of the Persian Nadir Shah was again recognized. Captured in 1760 by Hut Ali Khan, and governed after his death by his brother Sheikh Ali, the town was in 1786 besieged by the Russians both by land and sea, and in 1813 formally incorporated by the treaty of Gulistan with the Russian empire. In 1831 it was vainly attacked by Kazi-mullah. Population in 1873, 15,739.

Plate II.

DERBY, COUNTY OF, lies as nearly as possible in the centre of England, being about equally distant from the eastern and western seas. In the time of the Britons it was part of the district which constituted the kingdom of the Cœtani. While under the Roman sway it formed a part of Britannia Prima; and under the Heptarchy it belonged to the kingdom of Mercia. It is bounded on the E. by Nottinghamshire and a part of Leicestershire, on the W. by Staffordshire and Cheshire (from which it is separated by the river Trent, Dove, Etherow, and Goyt), on the N. by Yorkshire and a part of Cheshire, and on the S. by Leicestershire. Its greatest length from S.E. to N.W. is 56 miles, its greatest width from N.E. to S.W. is 33 miles. It contains an area of 656,243 statute acres, equal to about 1023½ square miles. Its population in 1851 amounted to 295,084 persons, in 1861 to 309,327, and in 1871 to 379,394, of whom 190,587 were males, and 188,807 females. From the beginning of the century down to 1871, 13 per cent. was the mean rate of increase in each intermediate period of ten years; while from 1861 to 1871 the total increase was 40,067, or at the rate of nearly 12 per cent. For practical purposes the population may be taken at 400,000, giving an average of 0-60 persons per acre, or 1-83 persons per square mile. As nearly as possible, as given in the Owners of Land Return, 1873, was £1,658,993.

Derbyshire is divided into the hundreds of High Peak, Scarsdale, Appletree, Repton and Gresley, Morleston and Littlehales, and the wapentake of Wirksworth. It consists of 331 parishes, townships, and parts of parishes. It has a court of quarter sessions, and is included as an archdeaconry in the diocese of Lichfield. For electoral purposes the county has been formed into the 3 divisions of east, north, and south, each returning 2 members to Parliament, and thus, with the 2 members from the borough of Derby, is represented by a total of 8 members.

The geographical or physical aspect of Derbyshire is very diversified. The southern part presents little that is picturesque, or in any way striking, being for the most part a level surface, with occasional slight undulations. In its northern portions, however, particularly in the bold and mountainous regions of the High Peak, there are imposing combinations of those features which go to constitute impressive and romantic scenery. In the more hilly districts, some of the valleys and dales are very beautiful, notably the valleys of Castleton and Glossop, Doveley, Millersdale, and the dale of Matlock. Derbyshire is on the whole a well-wooded county, and in the spacious parks surrounding the numerous mansions of noblemen and others which it contains, may be seen many fine oaks of noble appearance, those at Kedleston, the seat of Lord Scarsdale, three miles from Derby, being considered among the largest and oldest in the kingdom.

The climate, as might be expected from the diversified configuration of the land, varies very considerably in different parts. From the elevation which it attains in the northern division the air is colder and is more frequently vusted with rain than other midland counties. In summer cold and thick fogs are often seen hanging over the rivers, and clinging to the lower parts of the hills, and hoar-frosts are by no means unknown even in June and July. Owing to the great elevation some kinds of grain will not grow at all in many of the northern parts, while that which is sown in the more sheltered spots is exceptionally late in coming to maturity. The winters there are generally severe, and the rainfall heavy. At Relper, in 1876, there were 36 01 inches of rain during the year, while the average for the five years was 32 09 inches per annum.

The elevation of the land proceeds gradually from south to north, the greatest altitudes being attained in the northern division of the county, which is of a distinctly mountainous character. The mountains (or the plateau) of North Derbyshire may be said to form the central watershed of England, containing the source of many large rivers—as the Don, the Trent, and the Mersey. The highest altitudes are Kinder Scout (181 feet), the Peak (1860), and, on the borders of Cheshire and Staffordshire, Axe Edge (1751).

From Axe Edge the streams of the county radiate. Those of the north-west belong to the Mersey, and those of the north-east to the Don, but all the others to the Trent, which, like the Don, falls into the Humber. The principal river is the Trent, which, rising in the Staffordshire moorlands, does not intersect this county, but forms its south-west boundary for some distance, separating Derbyshire from Staffordshire on the south. After the Trent the most important river is the Derwent, one of its tributaries, which, taking its rise in the lofty ridges of High Peak, flows southward through a succession of striking and beautiful scenery, receiving a number of minor streams in its course. The other principal rivers are the following. The Dane rises at the junction of the three counties, Yorkshire, Cheshire, and Derbyshire. The Goyt has its source a little further to the south of the same hill, and, taking a N.N.E. direction, divides Derbyshire and Cheshire, and falls into the Mersey. The Dove rises on the southern slope, and flows on as the boundary stream between Derbyshire and Staffordshire for about 45 miles. It receives several feeders, and falls into the Trent at Repton. The Erewash is the boundary between Notts and Derbyshire. The Rother rises about Baslow, and flows north-east into Yorkshire. A little more to the west are the Sheaf, Wallin, Poultier, and Ryton, which flow into the Don at Sheffield.

Canals.—There are numerous canals intersecting this county in various directions. The Trent and Mersey or Grand Trunk canal, communicating between Liverpool and
London, and also with Bristol and Hull, was begun in 1776 by the celebrated Bridgley, a native of the county, and completed under Smeaton and Rennie. It passes through Derbyshire from Burton, following the course of the Trent. The Chesterfield canal was begun in 1771 by Bridgley, and completed by his brother-in-law, Mr. Henshaw, in 1776. It enters the county at Killamarsh, and terminates at Chesterfield. There are also the Langley Bridge or Erewash canal, the Peak Forest canal, the Ashton-under-lyne, the Cromford, the Ashby-de-la-Zouch, the Derby, and the Nutbrook canals.

Nowhere have railways received a more complete development than in this county, and nowhere are there their beneficial effects more apparent. For this the system of the Midland Company must claim the chief credit. The roads in Derbyshire are numerous, and generally in good condition. The great road from London to Manchester crosses the Trent near Sharrow, and passes through Derby and Ashbourne into Staffordshire.

**Geology, Minerals, &c.**—With the exception of drift gravel, and some alluvial deposits, the rocks of this county belong to the Palæozoic and Mesozoic systems. The mountain limestone underlies all the other rocks, and in the Peak district rises to a great elevation. It is in this formation that the well-known caves of Derbyshire occur. The calcareous rocks are confined to the western side of the county—Tissington being the southern, Castleton the northern, Ax Edge the western, and Matlock the eastern extremities. There is also an outcrop at Crich. The intrusive beds of toadstone (some of which attain a thickness of 200 feet) and volcanic mark great submarine eruptions when the ancient lava was spread over the sea-bottom. It is estimated that upwards of half a million tons are worked yearly. The marbles are numerous and valuable for ornamental purposes. Derbyshire also contains several metallic ores—viz., galena, barytes, zinc, calamine, fluor spar, and elaterite. Galena (sulphide of lead) is obtained rather extensively, some mines near Castleton having been worked by the Romans. In 1874 the quantity raised was 4901 tons, from which were extracted 800 ounces of silver. In connection with galena zinc is found, of which 4050 tons were raised in 1876; of calamine (carbonate of zinc) 30 tons. Barytes is used as an inferior white paint, and also for ornamental purposes. The total output for 1876 was 3700 tons. Blue john is a somewhat rare fluor spar, impregnated with oxides of manganese. It is one of the most ornamental minerals of the country, and is much used in the manufacture of tazza, brooches, &c. In one or two places a thin slice of coal is found in the mountain limestone. Copper was once worked in this formation at Eaton, on the border of the county, but it has never been abundant. Traces of gold have also been found in toadstone. Chert is got near Bakewell, and is used for the manufacture of porcelain. The most remarkable and rare mineral is elaterite, or elastic bitumen, found at Windy Knoll, near Castleton. It is found only at two other places—at Montreuil in France, and in Connecticut, United States. The fossils of this formation may be briefly tabulated as follows. From Etheridge's last—Calcicentura, 54 species; Echnodonitula, 27; Crustacea, 15; Brachiopoda, 90; Lamellibranchia Monomytila, 29; Gasteropoda, 55; Cephalopoda, 31; Piscis, 12.

The surface soils of the mountain limestone are very unproductive, and, as a rule, can only be used for grazing. The Yoredale rocks make a much more rounded shore formation, furnishing also the range of hills between Hope and Edale valleys, and extends to the north of the Peak, attaining a thickness of 500 feet. As is usual with this rock, frequent landslips take place, notably at Alport Tower, Dove Dale, and at the southern bank of Mam-Tor, the latter having carried with it part of the old Roman camp. The Millstone Grit is part of a large formation stretching into adjacent counties. It is a long, narrow outcrop, running from north to south, on the whole western side of the Coal Measures from Stannedge Pole to Little Eaton. There is also an outcrop, 200 feet thick, south of the Peak. The high table-land of the Peak is of this formation. It is a valuable building-stone, and as such it is extensively used, as well as for millstones, from which it derives its name. The Coal Measures are the southern continuation of the great Yorkshire coal-field. They occupy the larger portion of the eastern side of the county from a few miles south of Sheffield to near Bakeworth Hall, where they disappear under the Permian. The coal-field (which extends into Notts) covers an area of about 700 square miles, 230 of which are in this county. At Shireoaks the top hard coal is worked, at a depth of 710 yards, the overlying Permian rock being only 200 feet thick. The principal coals worked are the deep soft and deep hard, both important. Still more so is the clog, or black shale, but the best of all is the Kilbourne, near Belper, which is equal to the best Newcastle. upwards of 1200 people are employed in the Derbyshire coal-fields, which produce annually more than 7,000,000 tons. The ironstones associated with this coal-field are very valuable, yielding upwards of 130,000 tons annually. The Permian is represented in the north-east by a narrow strip of Magnesian Limestone, which is said to be one of the best building stones in the kingdom. The surface soils of this formation are probably the most fertile in the county, its barley or malt having become famous. A narrow strip of the Bunter stretches just on the edge of the Yoredale, from Ashbourne to Quarnford, and patches occur to the north of Broadal, at Sandacre, and in the neighbourhood of Repton. The Keeper Red Marl and Sandstone occupy the larger part of South Derbyshire, the most northly part being near Ashbourne. The sandstones are extensively used for building purposes. An important bed of gypsum is worked at Challaston, which is burnt and pulverized for making plaster of Paris, the white variety being made into chimney ornaments, statuettes, &c. The Dritt Gravel is confined almost to the south and east of the county. Near Derby it is very abundant. Much light has been thrown upon the fauna of the Paleocene period by the researches of Mr. Pennington at Castleton, and Mesers Mills and Heath at Creswell. The more rare and important "inds" are the mammoth, woolly rhinoceros, Iush elk, deer, &c., and a large pelecanus (!), &c., and a large pelicanus (!), &c., and a large pelecanus (!), &c., and a large.

**Agriculture.**—In the valley of the Trent a large surface is laid down in permanent grass, being devoted to cattle-feeding and dairy purposes, while heavy crops of wheat, turnips, &c., are grown in other parts of the district. Dairy farms are numerous, and Derbyshire cheese, which holds a high reputation, is annually sent to the metropolis, or to the seaports for exportation. Cheese fairs or markets are held in various parts of the county, as at Derby, Burton-on-Trent, Ashbourne, Uttoxeter, and Long Eaton. Barley is much cultivated, especially about Repton and Greetley, and also in the east of the county, the predominant being grown from the proximity of Burton, the great seat of the brewing industry. In the upland districts, where the soil is poor and the climate harsh and unfriendly, the agricultural industry is much less important and profitable. It is chiefly devoted to the feeding of sheep. The following figures, taken from the Agricultural Returns for 1875 and 1876, shows the distribution of the agricultural acreage of the county, and the numbers of live stock, in those years:—
The antiquities of Derbyshire are of considerable interest. One of the more noteworthy is a causeway, or Roman paved road, called Bathgate, running seven miles from Buxton to a small village called Brough, which road from its name seems to indicate that the Buxton waters were known to the ancients. Rocking-stones exist near Rowter and at other places; Druidical remains, in the form of a Druidical temple, on Stanton moor, with a large number of associated objects which seem to justify the assumption that it has been inhabited by Druids. On Hartle moor, at Arblow, is another Druidical temple, with its barrows and tumuli; there are others on the moor near Eyam, and near Edale. Barrows are found at Arblow, Brampton, on the moor near Eyam, and at Taddington. At Taddington is one of the most perfect examples now existing. Roman stations are to be found near Buxton, at Little Chester (which is the old Roman town Derwentio), and at Mam-Tor, near Castleton, where there is also an encampment.

At Repton, in 660, "there was a noble monastery of religious, of both sexes, under an abbot, after the old Saxon fashion, wherein several of the royal line were buried." This was afterwards destroyed by the Danes, when Maud, widow of Ranulph, second earl of Chester, built a priory for Black Canons in 1172. Here the Mercian kings who resided at Tamworth were buried. At Melbourne is a castle which was a royal demesne at the Conquest, and where John, duke of Bourbon, taken at the battle of Agincourt, was kept nine years in the custody of Nicholas Montgomery the younger.

Derby, the county town of Derbyshire, is a corporate and borough town, sending two representatives to Parliament, and consisting of five parishes. It is situated chiefly on the western bank of the river Derwent, upon ground of varying heights, and is surrounded with gentle eminences, from which flow the Manchestor and other brooks. It occupies a position almost in the centre of England, 127 miles N.W. of London. Derby possesses several large public buildings, including the town hall, a spacious range of buildings recently erected for the postal and telegraph departments and the inland revenue offices, the county gaol, a new ma­sonic hall, All Saints Church, and water-works erected at a cost of £4,000, and since greatly extended. A recreation ground, free to the public and a memorial of the visit of the Prince and Princess of Wales. There are flourishing schools of art and science, a large and commodious infirmary for town and county, an arboretum of 17 acres, given to the town in 1840 by the late Joseph Strutt, Esq., a market square, a market hall, and water-works erected at a cost of £40,000, and since greatly extended. A recreation ground, free public swimming baths, a free library, and museum buildings have all been presented to the town by Mr. M.T. Bass. Since about 1850 Derby has been greatly improved and extended owing chiefly to the impulse given by the establishment of the head offices and principal workshops of the Midland Railway Company, and will be still further improved by the construction now in process of a branch of the Great Northern Railway, which passes through the town over a long series of arches.

Ecclesiastical Buildings.—Derbyshire is distinguished for numerous old and interesting churches. The prevailing style of the churches is the Norman, and next to that the Early English, the style which immediately succeeded it. Steeple Chancel, near Whitwell, on the east side of the county, is one of these. Sir Richard Arkwright in 1771. Hosiery manufactory has been for numerous old and interesting churches. The prevailing style of the churches is the Norman, and next to that the Early English, which is the most complete and beautiful specimen of Norman work, on a small scale, that can be met with anywhere in this country or in Normandy." It was probably built during the reign of Stephen, 1135–54.
Derby has been long celebrated for its porcelain, which rivalled that of Saxony and France. This manufacture was introduced in the year 1750, and although for a time partially abandoned, it has been so far revived, and is still continued. There are also spar works where the flour spar, or blue john, is wrought into a variety of useful and ornamental articles. The manufacture of silk, hosiery, lace, and cotton formerly employed a large portion of the population, and there are still many silk mills and elastic web works, &c. The iron manufacture is also of great importance; among the larger establishments may be mentioned the Britannia Works, which furnished the roof of the great Agricultural Hall, London.

The sanitary condition of the town is much improved since the formation of a local board, and the rate of mortality is low. Among benevolent institutions may be mentioned a ragged school, and a nurses' or "home." The population of the municipal borough, which occupies an area of 1798 acres, numbered 46,609 persons in 1851, 43,091 in 1861, and 49,810 in 1871. The parliamentary borough, which in 1867 was extended so as to include the townships of Litchurch and Little Chester, and covers an area of 2999 acres, had a population in 1871 of 61,381—29,882 males and 31,499 females.

Derby is a town of great antiquity, but its origin is unknown. During the Heptarchy it was called Northwrothig, and its present name Derby, or Deoraby, is due to the Danes. Constituted in the ninth century the chief town of the county by King Egbert, Derby was incorporated by Henry I. Its charter was surrendered to Charles II. in 1660, and a new one was granted in 1683, by which the government of the borough was vested in a mayor, 9 aldermen, 14 brethren, and 14 capital burgesses. In 1835 the town council was re-organized under the Municipal Corporations Act, and now consists of a mayor, 12 aldermen, and 36 councillors. Derby was the furthest place reached by the Pretender in his march towards London in 1745, he lodged in Exeter House, Fleet Street, and held there a council of war, which resulted in the abandonment of his project.


DERBY, Edward-Geoffrey Smith Stanley, Fourth Earl of, Barons Stanley of Ebercotestaffs and a baronet (1799-1869), born at Knowsley in Lancashire, on the 29th March 1799, was the eldest son of Lord Stanley, who afterwards (1834) became the thirteenth earl of Derby. The title in the direct line of succession to which he was thus born ranks second in precedence among the earldoms in the peerage of England. He was educated at Eton and at Christ Church, Oxford, where he distinguished himself as a classical scholar, though he took only an ordinary degree on quitting the university. In 1819 he obtained the Chancellor's prize for Latin verse, the subject being "Syracuse." He gave early promise of his future eminence as an orator, and it is said that in his youth he used to practice eloquence under the instruction of Lady Derby, his grandfather's second wife, who was Miss Eliza Farren had been a celebrated actress. With such an inclination and aptitude for public speaking, the heir to an ancient title was only fulfilling his natural destiny in seeking a seat in the House of Commons, and of course he had no difficulty in finding one. In 1820, soon after he had attained his majority, he was returned for Stockbridge in Hampshire, one of the nomination boroughs whose electoral rights were swept away by the Reform Bill of 1832, Stanley, like several others who entered parliament by means of them, being a warm advocate of their destruction. It may appear somewhat strange that he should have remained for four years, so far as is known, as a member; but the representative of a pocket borough had no constituency to consider, and there was not in those days the incentive to frequent speaking that is now furnished by full daily reports of the debates circulating through the entire country. His maiden speech was delivered early in the session of 1824 in the debate on a private bill for lighting Manchester with gas. Although the subject can scarcely have given scope for any high flight of oratory, the speaker was warmly complimented by Sir James Mackintosh, one of the first authorities in the House, who welcomed him as an accession to the Liberal ranks, and Hansard reports the speech as characterized by "much clearness and ability." His second appearance was made in connection with a subject—irrepressible as it proved, though he always did his utmost to repress it—which was afterwards to determine more than one important turning point in his political career, and to call forth his last utterance in parliament. It is noteworthy also as an early exhibition of the Conservative instinct whose growing strength led gradually to an entire change of his political position. On the 8th May 1824, he delivered what seems to have been a vehement and eloquent speech against Joseph Hume's motion for a reduction of the Irish Church establishment, maintaining in its most conservative form the doctrine that church property is as sacred as private property. From this time his appearances became frequent, and he soon asserted his place as one of the most powerful...
speakers in the House. Specially noticeable almost from the first was the skill he displayed in reply. Macaulay, in an essay published in 1834, remarked that he seemed to possess intuitively the faculty which in most men is developed only by long and laborious practice. "Indeed, with the exception of Mr Stanley, whose knowledge of the intricacies of parliamentary defence resembles an instinct, it would be difficult to name any eminent debater who has not made himself a master of his art at the expense of his audience."

In the autumn of 1824 Stanley went on an extended tour through Canada and the United States in company with Mr Labouchere, afterwards Lord Taunton, and Mr Evelyn Denison, afterwards Lord Ossington. In May of the following year he married the second daughter of Edward Bowles-Wilbraham, created Baron Skelmersdale in 1828, by whom he had a family of two sons and one daughter who survived, besides three children who died in infancy.

At the general election of 1826 Stanley renounced his connection with Stockbridge, and became the representative of the borough of Preston, where the Derby influence has usually, though not invariably, been paramount. The change of seats had this advantage, that it left him free to speak against the system of rotten boroughs, which he did with great force during the Reform Bill debates, without laying himself open to the charge of personal inconsistency as the representative of a place where, according to Gay, cobblers used to "fast three years upon one vote." In 1827 he and several other distinguished Whigs made a coalition with Canning on the defection of the more undying Tories, and he commenced his official life as under-secretary for the colonies. Whether the coalition arrangement would have proved stable had its distinguished leader survived is more than questionable, but it was entirely broken up by his death in August of the same year.

Lord Godertch, who had been Stanley's chief at the Colonial Office, succeeded to the premiership, but he never was really in power, and he resigned his place after the lapse of a few months without venturing to meet parliament. During the succeeding administration of the duke of Wellington (1828-30), Stanley and those with whom he acted were in opposition. His robust and assertive Liberalism about this period sounds somewhat curiously to a younger generation who knew him only as the very embodiment of Conservatism. They can find little of the earl of Derby, except his characteristic force of expression in the conviction uttered by Stanley, "that the old and stubborn spirit of Toryism is at last yielding to the liberality of the age—that the Tories of the old school, the sticklers for 'invariable' abuses under the name of the wisdom of our ancestors, the laudatores temporis acti are giving way on all sides." Even the most retrograde political party, however, makes distinct progress almost in spite of itself as the years pass on, and Lord Derby might very well have managed that the Toryism he represented in his maturity was not the Toryism he had denounced in his youth.

By the advent of Lord Grey to power in November 1830, Stanley obtained his first opportunity of showing his capacity for a responsible office. He was appointed to the chief secretarieship of Ireland, a position in which, as it turned out, he found ample scope for both administrative and debating skill. On accepting office he had, according to the usual practice, 'vocet' his seat for Preston and seek re-election; and it must have been peculiarly mortifying to one of his high spirit, in spite of his family influence and growing reputation, to learn that the whole of the members of the new ministry in the Lower House failed to secure his return. He was defeated, and the defeat was doubled. He still was rendered more bitter by the fact that his opponent was the Radical "orator" Hunt. The contest was a peculiarly keen one, and turned upon the question of the ballot, which Stanley refused to support. He re-entered the House as one of the members for Westminster, Sir Hussey Vivian having resigned in his favour. In 1832 he again changed his seat, being returned for North Lancashire, which he continued to represent until his elevation to the House of Lords.

Mr Stanley was one of the most ardent supporters of the great measure which has made Lord Grey's administration the most memorable of the present century. Of this no other proof is needed than his frequent parliamentary utterances, which were fully in sympathy with the popular cry "The bill, the whole bill, and nothing but the bill." Reference may be made especially to the speech he delivered on the 4th March 1831 on the adjourned debate on the second reading of the bill, which was marked by all the higher qualities of his oratory. More than thirty years later, when he was premier, he was again called upon to deal with the question, and he had statesmanship enough to settle it on a permanent basis; but the incertitude with which he then took what he himself called a leap in the dark was in curious contrast to the clear conviction with which he advocated the earlier measure.

Apart from his connection with the general policy of the Government, Stanley had more than enough to have employed all his energies in the management of his own department. The secretary of Ireland has seldom an easy task; Stanley found it one of peculiar difficulty. The country was in a very unsettled state. The just concession that had been somewhat tardily yielded a short time before In Catholic emancipation had excited the people to make all sorts of demands, reasonable and unreasonable. As one result of that concession these demands were now permitted to be urged on the floor of the House by the most eloquent and the most widely popular representative Ireland has ever possessed,—one, too, whose hatred of the "base, bloody, and brutal Whigs" seems to have totally unfitted him for judging Whig measures fairly. Problems of great practical difficulty in connection with the land and the church had an urgent demand for solution; and the alarming increase of agrarian outrages demanded even more urgently the instant application of vigorous measures of repression. Mr Stanley's conduct in these trying circumstances showed that he had the spirit that resists with difficulties. Undaunted by the fierce denunciations of O'Connell, who styled him Scorpion Stanley, he discharged with determination the ungrateful task of carrying a Coercion Bill through the House. Parliament has probably seldom witnessed warmer or more personal encounters than those which took place about this time between the Liberator and the Irish Secretary, and seldom has an official position been more gallantly defended. It was, generally felt that O'Connell, powerful though he was, had fairly met his match in Stanley, who, with invective scarcely inferior to his own, evaded no challenge, ignored no argument, and left no taunt unanswered. The title "Rupert of Dubste" is peculiarly applicable to him in connection with the fearless if also often reckless method of attack he showed in his parliamentary war with O'Connell. It was first applied to him, however, thirteen years later by Sir Edward Bulwer Lytton in the following passage of The New Tamar.

"One after one the lords of time advance;
Here Stanley meets—here Stanley scorn the glance!
The brilliant chief, urvet, stately,
Faint, haughty, rash,—the Rupert of debate."

The best answer, however, which he made to the attacks
of the great agitator was not the retorts of debate, effective though these were, but the beneficial legislation he was instrumental in passing. Two of his measures deserve special mention. He introduced and carried the first national education act for Ireland, one result of which was the remarkable and to many almost incredible phenomenon of a board composed of Catholics, Episcopalians, and Presbyterians, harmoniously administering an efficient educational system. He was also chiefly responsible for the Irish Church Temporalities Act, though the bill was not introduced into parliament until after he had quitted the Irish secretariery for another office. By this measure two archbishoprics and eight bishoprics were abolished, and a remedy was provided for various abuses connected with the revenues of the church. As originally introduced, the bill contained a clause authorizing the appropriation of surplus revenues to non-ecclesiastical purposes. This had, however, been strongly opposed from the first by Stanley, and several other members of the cabinet, and it was withdrawn by the Government before the measure reached the Lords. There was therefore no ground for the charge of inconsistency brought against Stanley, when a year later he seceded from the cabinet on the proposal being renewed.

In 1835, just before the introduction of the Irish Church Temporalities Bill, Stanley had been promoted to be secretary for the colonies with a seat in the cabinet. In this position it fell to his lot to carry through parliament a measure which is one of the abiding glories of English legislation. The agitation for the emancipation of the slaves had been mainly the work of others whose names have become historical in connection with it; but to Stanley belonged the honour and privilege of bringing it to a successful practical issue in the pages of the statute book. The speech which he delivered on introducing the bill for the emancipation of the slaves in the West Indies, on the 14th May 1833, was one of the finest specimens of his eloquence. It showed a philhopespunt and a love of freedom which proved him to be a not unworthy associate of Clarkson, Wilberforce, and Buxton, and it was admirable for the clear statement of the somewhat complicated arrangement by which the abolition of slavery was to be brought about. The latter quality was still more conspicuous in committee, through which Stanley carried the measure with the firmness and tact of true statesmanship.

It has already been said that the Irish Church question determined more than one turning-point in Mr. Stanley's political career. The most important occasion on which it did so was in 1834, when the proposal of the Government to appropriate the surplus revenues of the church to educational purposes led to his secession from the cabinet, and, as it proved, his complete and final separation from the Whig party. In the former of these steps he had his companions Sir James Graham, the earl of Ripon, and the duke of Richmond. Soon after it occurred, O'Connell, amid the laughter of the House, described the secession in a couplet from Canning's "Loves of the Triangle":

"Still down thy steep, romantic Ashbourne, glides
The Derby daily carrying six trades."

Stanley was by no means content with marking his disapproval of the conduct of the Government of which he had been a member by the simple act of withdrawing from it. He spoke against the bill to which he objected with a vehemence that showed the strength of his feeling in the matter, and against its authors with a bitterness that he himself is understood to have afterwards admitted to have been unseemly towards those who had so recently been his colleagues. The language of one speech deserves to be quoted as a good specimen of what he could do in the way of invective when he chose "Thunder," a term very familiar in more recent debates on the same long-versed question, was perhaps the mildest word he used. The course followed by the Government was "marked with all that timidity, that want of dexterity, which led to the failure of the unpractised shopifter." His late colleagues were compared to "thimble-riggers at a country fair," and their plan was "petty larceny, for it had not the redeeming qualities of bold and open robbery.

In the end of 1834, Lord Stanley, as he was now styled by courtesy, his father having succeeded to the earldom in October, was invited by Sir Robert Peel to join the short-lived Conservative ministry which he formed after the resignation of Lord Melbourne. Though he declined the offer for reasons stated in a letter published in the Pecl memoirs, he acted from that date with the Conservative party, and on its next accession to power, in 1841, he accepted the office of colonial secretary, which he had held under Lord Grey. His position and his temperament alike, however, made him a thoroughly independent supporter of any party to which he attached himself. When, therefore, the injury to health arising from the late hours in the Commons led him in 1844 to seek elevation to the Upper House in the right of his father's barony, Sir Robert Peel, in answering to his request, had the satisfaction of at once freeing himself from the possible effects of his "candid friendship" in the House, and at the same time greatly strengthening the debating power on the Conservative side in the other. If the premier in taking this step had any presentment of an approaching difference of a vital kind in view, it was not long in being realized. When Sir Robert Peel accepted the policy of free trade in 1846, the breach between him and Lord Stanley was, as might have been anticipated from the antecedents of the latter, instant and irreparable. Lord Stanley at once asserted himself as the uncompromising opponent of that policy, and he became, as his position warranted, the recognized leader of the Protectionist party, having Lord George Bentinck and Mr. Disraeli for his lieutenants in the Commons. They did all that could be done in a case in which the logic of events was against them, but their watch-word of Protection was never to become more than a watchword. It is one of the peculiarities of English politics, however, that a party may come into power because it is the only available one at the time, though it may have no chance of carrying the very principle to which it owes its organized existence. Such was the case when Lord Derby, who had succeeded to the earldom on the death of his father in June 1851, was called upon to form his first administration in February 1852. He was in a minority, but the circumstances were such that no other than a minority Government was possible, and he resolved to take the only available means of strengthening his position by dissolving parliament and appealing to the country at the earliest opportunity. The appeal was made in autumn, but its result did not materially alter the position of parties. Parliament met in November, and by the middle of the following month, the ministry had resigned in consequence of their defeat on the clever but financially unsound budget proposed by Mr. Disraeli. For the six following years, during Lord Aberdeen's "ministry of all the talents" and Lord Palmerston's government, Lord Derby remained at the head of the opposition, whose policy gradually became more generally Conservative and less distinctly Protectionist as the hopelessness of reversing the measures adopted in 1846 made itself apparent to all but the most reactionary party. In 1855, he was able to form an administration after the resignation of Lord Aberdeen, but failing to obtain sufficient support, he
declined the task. It was in somewhat more hopeful circumstances that, after the defeat of Lord Palmerston on the Conspiracy Bill in February 1858, he assumed for the second time the reins of government. Though he still could not count upon a working majority, there was a possibility of carrying on affairs without sustaining defeat, which was realized for a full session, owing chiefly to the dexterous management of Mr Disraeli in the Commons. The one rock ahead was the question of Reform, on which the wishes of the country were burning emphatically. Derby devoted himself with great industry to the task he had chosen as his opus, and the translation of the whole of the Iliad accordingly appeared in 1864. The fact that it was somewhat more hopeful afterwards did not prevent him from taking any large share in those discussions which took place in the Lords. His description of the measure as a "leap in the dark," was eagerly caught up, because it exactly represented the common opinion at the time,—the most experienced statesmen, while they admitted the grant of household suffrage to be a political necessity, being utterly unable to foresee what its effect might be on the constitution and government of the country.

Finding himself unable, from declining health, to encounter the fatigues of another session, Lord Derby resigned office early in 1868. The step he had taken was announced on the evening of the 25th February, and warm tributes of admiration and esteem were paid by the leaders of the two great parties. He was succeeded by Mr Disraeli, to whom he yielded the entire leadership of the party as well as the premiership. His subsequent appearances in public were few and unimportant. It was noted as a consistent close to his political life that his last speech in the House of Lords should have been a denunciation of Mr Gladstone's Irish Church Bill marked by much of his early fire and vehemence. A few months later, on the 23rd October 1869, he died at Knowsley.
tect orator of his day." Even higher was the opinion of Lord Aberdeen, who is reported by the Times to have said that no one of the giants he had listened to in his youth, Pitt, Fox, Burke, or Sheridan, "as a speaker, is to be compared with our own Lord Derby, when Lord Derby is at his best."

DEREVEH, or DERAYA, a town of Arabis, in the Nejd, on the caravan-route from the Red Sea to the Persian Gulf, about 15 miles west of Raed. It was formerly the capital of the Wahabees, and had a population of about 50,000 inhabitants; but it has never recovered from the ruin inflicted on it by the army of Ibrahim Pasha in 1818.

DERHAM, WILLIAM (1657-1735), an eminent English divine and natural philosopher, was born at Stoughton, near Worcester, in 1657. He received his early education at Bloxley, in his native county, and in 1672 graduated with much distinction at Trinity College, Oxford. Three years later he became rector of Wargrave, in Berkshire; and in 1689 he was preferred to the living of Upminster, in Essex. In 1686 he published his Artificial Clockmaker, which went through several editions. The best known of his subsequent works are Physico-Theology, published in 1713, Astro-Theology, 1714, and Christo-Theology, 1730. In consideration of these contributions to science and theology he was, in 1716, made a canon of Windsor; and in 1730 he received the degree of D.D. from Oxford. His last work, entitled A Defence of the Church's Right in Lassoehold Estates, appeared four years previous to his death, which happened in 1735. Besides the works published in his own name, Derham contributed a variety of papers to the Philosophical Transactions, revised the Worcester Cursus, edited the correspondence of John Ray, and Albin's Natural History, and published some of the MSS. of Hooke, the natural philosopher.

DERVISHE is a Persian word meaning "the sill of the door," or those who beg from door to door. The Arabic equivalent is fakir, or fuzee. The dervishes of the Turkish empire may be said to constitute the regular religious orders, and are distinguished from the ulama, or secular clergy. In Turkey, Egypt, Persia, Hindustan, and Central Asia, however, dervishes, or fakirs, are to be found in great number who belong to no society, but are simply mendicants or single devotes, many of whom subsist by professional jugglery. Especially is this true of the Byzantines, the Dandis, the Bhikshools, the Wanaprastas, the Sunnayas, the Aghorphats, the Gweers, the Yogis, the Ossians, the Jutas, and the Loopec Jungsas of northern Hindustan, and still more emphatically of the Bongas, or Buddhist monks. But in the more favourable sense of the word, the dervishes represent Sozan, or the spiritual and mystic side of Islam. Long before the time of Mahomet, Arab societies were divided, as if by Greek and Indian influences, into the schools of the Meshchauons (the walkers) and the Ischmachaions (the contemplators). When the Koran appeared, these became the Mutekeelum (metaphysicians), and the Soza (mystics). The latter put an esoteric interpretation on both the Koran and the Hadid, and collected sayings of the Prophet; they dispense with the jamaat and other formalities of the mosque; they in many cases recognize the fact of spiritual religion outside Islam; and in general they observe the rules of poverty, abstinence from wine, and celibacy. The name fakir, nubabaa, or master, from the saying of the Prophet, "El fakir fahbtr," poverty is my pride. The six Erkhan, or pillars of the Teasvulf, or spiritual life, are (1) the existence of God, (2) His unity, (3) the angels, (4) the prophets, (5) the day of resurrection, and (6) good and evil through God's predestination. But it is only the Tanakits, or orders (it. pathis), among the more orthodox or Sunnite Mahometans who attach much importance to positive dogma. The Shihite party, especially the Persian dervishes, who trace their descent through various sheikhs and peers from Ali, the fourth caliph, believe that "the paths leading to God are as many as the breaths of his creatures." These form the great majority of the orders; for it is stated in a work called the S JLUEK uELEI UTLAK (Genealogy of the Saints of God), last edited in 1738, that, out of 36 well-defined orders, 12 of which were in existence before the beginning of the Ottoman empire, only 3, viz., the Bestamis, the Nakshebends, and the Dektashis, are descended from the congregation of Abu Bekr, the second caliph, and that all the others are descended from the caliph Ali. As the dervishes do not recognize the legal exposition which the ordinary tribunals give of the letter of the Koran, and acknowledge no authority but that of their spiritual guide, or of Allah himself speaking directly to their souls, the Ottoman sultans have always regarded them with jealousy, and in 1826 Mahmoud entirely suppressed the order of the Dektashis, which had for centuries been closely connected with the Janissaries, or Hoo Koshans (num scatterers), and which is said to have formed part of a Perousm (freemasonry) extending through Palestine, Syria, and Turkey. The other orders, however, or most of them, have survived to the present day, and are generally popular,—one of them, the Mevlevi, being crowned by persons from the highest and wealthiest ranks. But membership, when it does not proceed beyond the first stage of Sin'at or Sher'at, i.e., legal religion under the supervision of a murslin, may be satisfied by the repetition of a few prayers at home and the wearing of the sacred cap for a few minutes each day.

The regular dervishes live in tekkes, khanakhas, or convents, which are endowed with lands or wakf, just as the Muths of Hindustan are endowed with enan lands, incapaible of mortgage or alienation. Thus, in 1534, the sultan Amurath IV gave to the Bektashis of Komek the whole tribute paid by that city. Over each convent presides a sheikh, or murshid, who represents the pur, or original founder of the order. This corresponds to the mobhun, malik, or guru of Hindustan. Among the Persan Nosirits (who consider Mahomet an impostor, and perform no ablutions), the succession of sheikhs is hereditary,—elsewhere by seniority or election, confirmed by the Sheikh ul Islam. In Hindustan the selection takes place in a dastname, or council of mobhuns, called among the Sikhs a malk. The murd, or disciple, has to undergo a long initiation (called in Turkey, Ferar, in Egypt Akr) before he obtains the tayband, or woolen belt, with its palen or cabalistic "stone of contentment," the mungauy, or earrings shaped like the horse shoe of Ali, the khirka, or mantle; the tesbeeh, or rosary, containing the 99 names of God; and finally the Tij, or white cap, with the proper number of terks, or sections, belonging to the order. Similar distinctions are preserved in Hindustan by the barbarous method of marking on the forehead the sandal-wood stripes of Siva, or the white and red trident of Vishnu. In the Movlev order the murd goes through 1001 days of menial labour, and is during that time called the karra kolak, or jackal. It is not necessary, however, to give up one's private property; and many dervishes are permitted to remain in trade on the

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[1] This jealousy was not without foundation. The great political factions which disturbed Constantinople, the Ottomans, the Russes, the Whites, the Umayyads, the Lame, the Interpreters, the Hasshunites (from Hashish, whence assasining), were to some extent connected with the dervish orders. The Kabarees, founded by an Aasian dervish who was expelled from the Bektashis, furnished several pretenders to the title of Mehdi, the 12th Imam, whose second coming is looked for by all the mystics.

[2] The subsequent stages are Tarikat, mystical rites, Mevlevi, knowledge, and Bektash, truth.
principle stated by the Prophet, that "the seeker of gain is the friend of God." Some also are permitted to marry, just as among the Sikh faqirs of Nanuk those named Bashara (with the law), or Salik (travellers), are allowed to marry and to move about, those named Bashara (without the law), or Maznab (the abstracted), are condemned to celibacy and seclusion. But their lives are mainly directed to the production in themselves of the ecstatic state in which the soul enters the Alem-tmsal, or world of dreams, and becomes one with God. This part of Sofism strongly resembles Vedantism. Kaf, or quiescence, is often caused by the use of hashash (the Arabo Khoshkhoob, sold at Constantinople in pastilles called love), or by khalwes, retirement, and the erba'un, or fast for 40 days. Then they indulge in excessive and rapid repetitions of particular phrases, as the Esami Ilahi, or seven attributes of God, viz.,-La ilah ill Allah (no God but Allah), Ya Allah (O God), Ya Hoo (O Him), Ya Hakk (O Just God), Ya Haroon (O Living God). The Zikr consists mainly in a chant, always becoming louder and more violent, of the first attribute; thus—

This leads to the Devr, or rotation, in which the Rufai, or Bowling Dervishes, stand in a circle, shoulder to shoulder, each on his right foot, and swaying the body and the left leg backwards and forwards or side to side, the Sem's of the Melevi's, or Spinning Dervishes, in which a pirouette is performed all round the khaneh on the left heel, the eyes being closed, the arms outstretched, and other more violent dances, accompanied by the music of the nay, or flute, and tambourines, and by the cries of the dancers. In the Halet, or final ecstasy, the dervishes take hold of red-hot implements, place glowing charcoal in the mouth, and exhibit prodigies of muscular strength, which are in some cases the genuine and interesting effects of excitement, in others mere calculated imposture. At last the Jezbed, or attraction of God, begins to operate. Besides daily readings from the Koran, an infinity of small phrases, or terjumans, is repeated. These are connected with the khurkas, the palenok, the postaki, or vein, the sogudak, or carpet, and with almost every act and motion of the dervish within the monastery. A reboute, or silent prayer, is also practised. In return for these mystical rites the dervish obtains spiritual powers, of which the most remarkable is that called fascination, kuvveh radat, the power of the will, which depends on certain physical conditions, and seems to include prophecy and the phenomena of mesmerism. By vuf, or the science of numbers, a charm, composed of the names of the matlobb, or patient, and the arf, or knowing person (each letter of the alphabet has a numerical value), is placed on the knees of the latter, and by diligent blowing and mental concentration is secreted in the matlobb. Some dervishes cure diseases, sell talismans, called tilsims and nushkas, charm snakes, and some are musicians and dancers. It is in Egypt and Hindustan that the extreme degrees of aqshual, of imposture, and also of self-mortification are found. Some spend their lives in absolute nakedness, their bodies smeared with wood ash, their unkempt hair twisted into a turban, some roll head over heels for hundreds of miles; some contemplate the tip of the nose from 84 different postures; some live by the fraudulent sale of drugs or by feats of legemandism. All Mahometan dervishes hold a powerful belief in the perishing fate of the evil, or kaf, and the departed salhin (pure ones), the "unseen men or masters of destiny," who are sent forth from the kuth, or centre of the roof of the

Raaba, to control the spiritual affairs of the world. This is closely connected with the doctrine of tetaasun, or metampsychous, which, however, is held chiefly in a spiritual sense. The Bektashas believe that every one has a messi, or equal (doppel-ganger), who watches over him from the unseen region.

For an account of dervishes in Persia, where mysticism has been refined by the poetry of Boehn, Shuck, and Hoka, and where the seven original orders of Hululiah, Itliah, Vissiveh, Askneh, Telkuche, Zunuche, Wabodeh, are still preserved, see Malcolm's History of Persia, and De Gohemont's Three Voreens, 1859; for Central Asia, the works of Vambery and other travellers; for Hindustan, the Peoples of India, by Kaye and Watson, 1858-75, and Steel's Hindu Costumes. For Egypt, where four orders are presided over by the Sheikh el Dekri, and where the ceremony of the Dosh, or the mounted sheik] riding over the bodies of the dervishes, is still practised, see Lane's Modern Egyptians; and for the general subject, The Dervishes, or Oriental Spiritualism, by J. B. Brown, Constantinople, 1868, which contains a number of valuable translations of Dervish MSS.
Desault was now in Paris, where he was received into the society of anatomy, and opened a school of anatomy in the winter of 1766, which was attended by about 300 pupils, a great proportion of whom were surgeons. His success excited the jealousy of the established surgeons and professors, who, although he was patronized and protected by some surgeons of great eminence, would have obliged him to renounce public teaching, had he not resorted to the expedient of adopting the name of another as a sanction to his proceedings. In 1776 he was admitted a member of the corporation of surgeons, and limited his finances at that time, that he was allowed to pay his fees at his own convenience. He succeeded to the position of honour in the corporation and academy of surgery, and in 1782 was appointed surgeon-major to the hospital of La Charité.

Descartes was now regarded as one of the first surgeons of Paris. He succeeded to the next vacancy at the Hôtel Dieu, and, after the death of Moreau, almost the whole surgical department of that hospital was intrusted to him. He instituted a clinical school of surgery there on a liberal and extensive plan, which attracted a great concourse of students, not only from every part of France, but also from other countries. He frequently had an audience of about 600, and most of the surgeons of the French army derived their knowledge from his lectures. He introduced many improvements into the practice of surgery, as well as in the construction of various surgical instruments.

In 1791 he published a work entitled *Journal de Chirurgie*, edited by his pupils, which was a record of the most interesting cases that had occurred in his clinical school, with the remarks which he had made upon them in the course of his lectures. But in the midst of his valuable labours he became obnoxious to some of the Revolutionists, and he was, on some frivolous charge, denounced to the popular sections. After being twice examined, he was seized on the 26th May 1793, while giving a lecture, carried away from his theatre, and committed to the prison of the Luxembourg. In three days, however, he was liberated, and permitted to resume his functions. When the school of health was established, he was appointed clinical professor for external maladies; and it was through his means that the Évêché was converted into an hospital for surgical operations. He died on the 1st June 1795 of an abortive fever, which he had caught two days previously while attending the dauphin in the Temple. An epistle was prevalent among the populace that he was poisoned because he had refused to do anything against the dauphin's life. The autopsy which was held went to disprove the story, but it shows the opium the public entertained of Desault's integrity. A pension was settled on his widow by the republic. The only work of which he is the sole author is entitled *Traité des Maladies Chirurgicales, et des Opérations qui leur conviennent*, in 2 vols 8vo.

See Petri's *Éloge de Descartes* (Lyons, 1795).
out life. Even then he had begun to distrust the authority of tradition and his teachers.

Two years before he left school he was selected as one of the twenty-four gentlemen who went to Livon to recast the heart of the murdered king as it was borne to its resting-place at La Flèche. At the age of sixteen he went home to his father, who was now settled at Rennes, and had taken a second wife from Brittany. During the winter of 1612 he completed his preparations for the world by lessons in horsemanship and fencing; and then in the spring of 1613, he started as his own master to taste the pleasures of Parisian life. Fortunately the spirit of dissipation does not seem to have carried him any perilous lengths; the worst we hear of is a passion for gaming. Here, too, he made the acquaintance of Claude Mydorge, one of the foremost mathematicians of France, and renewed an early intimacy with Marin Mersenne, an old fellow-student, senior by some years, at La Flèche, and now become Father Mersenne, of the order of Minim Friars. The withdrawal of the latter in 1614 to a post in the provinces was the signal for Descartes to abandon social life and shut himself up for nearly two years in a secluded house of Faubourg St Germain. Accident, however, betrayed the secret of his retirement; he was compelled to leave his mathematical investigations, and to take part in entertainments, where the only thing that chanced in with his theorising reverses was the music. The scenes of horror and intrigue which marked the struggle for supremacy between the various leaders who aimed at guiding the politics of France made Paris no fit place for a student, and held out little honourable prospect for a soldier. Accordingly, in May 1617, Descartes, now twenty-one years of age, set out for the Netherlands and took service in the army of Prince Maurice of Orange, one of the greatest generals of the age, who had been engaged for some time in a war with the Spanish forces in Belgium. At Breda he enlisted as a volunteer, and the first and only pay which he accepted he kept as a curiosity through life. There was a lull in the war; and the Netherlands were distracted by the quarrels of Gomarists and Arminians. During the leisure thus arising, Descartes one day, as he roved through Breda, had his attention drawn to a placard in the Dutch tongue, and as the language, of which he never became perfectly master, was then strange to him, he asked a bystander to interpret it into either French or Latin. The stranger, who happened to be Isaac Beeckman, principal of the college of Dort, offered with some surprise to do so into Latin, if the inquirer would bring him a solution of the problem,—for the advertisement was one of those challenges which the mathematicians of the age, in the spirit of the tournaments of chivalry, were accustomed to throw down to all comers, daring them to discover a geometrical mystery known to them fancied to themselves alone. Descartes promised and fulfilled; and a friendship grew up between him and Beeckman,—broken only by the literary dishonesty of the latter, who in later years took credit for the novelty contained in a small essay on music (Compendium Musices) which Descartes wrote at this period and intrusted to Beeckman.

After thus spending two years in Holland as a soldier in a period of peace, Descartes, in July 1619, attracted by the news of the impending struggle between the houses of Austria and the Protestant princes, consequent upon the election of the palatine of the Rhine to the kingdom of Bohemia, set out for Upper Germany, and volunteered into the Bavarian service. The winter of 1619, spent in quarters at Neuburg on the Danube, was the critical period in his life. Here, in his warm room (dans un poteau), he indulged those meditations which afterwards led to the Discourse on Method. It was then that, on the eve of St Martin's day, he "was filled with enthusiasm, and discovered the foundations of a marvellous science." He retired to rest with anxious thoughts of his future career, which haunted him through the night in three dreams, that left a deep impression on his mind. "Next day," he continues, "I began to understand the first principles of my marvellous discovery." The date of his philosophical conversion is thus fixed to a day. But the light was as yet dim; he had only glimpses of a method which should invigorate the syllogism by the co-operation of ancient geometry and modern algebra. For during the year that elapsed before he left Swabia (and whilst he sojourned at Neuburg and Ulm), and amidst his geometrical studies, he would fain have gathered some knowledge of the mystical wisdom attributed to the Rosicrucians; but the Invisibles, as they called themselves, kept their secret, and he found them not. His restlessnes of spirit 18 well shown by his hysteric records, the date of September 23, 1620, to make a pilgrimage to Loreto—"if possible, on foot from Venice; if not, in the most devout manner he could." Soon after the Bavarian troops were ordered into active service. He was present at the battle of Prague, where the hopes of the elector palatine were blasted (21st November, 1620), passed the winter with the army in Southern Bohemia, and next year served under Count Boucquoy in Hungary. On the death of this general Descartes quitted the imperial service, and in July 1621 began a peaceful tour through Moravia, the borders of Poland, Pomerania, Brandenburg, Holstein, and Freeland, from which he re-appeared in February 1622 in Belgium, and betook himself directly to his father's home in Brittany. The sole incident recorded of this excursion is his danger, when crossing in a small boat to Dutch Freeland, from the capidity of the crew, who had taken him for a rich merchant, but at once abandoned their murderous designs when they saw him return with drawn sword, in all the dignity of a French gentleman.

At Rennes, where the young family of his stepmother was growing up, Descartes probably found little to interest him; and, after he had visited the maternal estate of the king now put him in possession of, he took the opportunity of running up to Paris, where he found the Rosicrucians the topic of the hour, and heard himself credited with partnership in their secrets. A short visit to Brittany enabled him, with his father's consent, to arrange for the sale of his property in Pontoise. The proceeds were invested in such a way at Paris as to bring him in a yearly income of between 6000 and 7000 francs, a sum probably equal to more than £500 at the present day. Towards the end of the year Descartes was on his way to Italy. The natural phenomena of Switzerland, and the political complications in the Vallettina, where the Catholic inhabitants had thrown off the yoke of the Orins and called in the Papal army, attracted his attention, delayed him some time; but he reached Venice in time to see the ceremony of the doge's weddings with the Adriatic. After paying his vowes to Loreto, he came to Rome, which was then on the eve of a year of jubilee—an occasion which Descartes seized to observe the variety of languages and manners which the city then embraced within its walls. In the spring of 1625 he returned home by Mount Cenis, observing the avalanches,4 instead of, as his relatives hoped, securing a post in the French army in Piedmont.

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1 It was only published after the author's death; and of it, besides the French version, there exists an English translation "by a Person of Quality."

For an instant Descartes seems to have concurred in the plan of purchasing a post at Châltemeult, but easily gave up the idea, and settled in Paris (June 1625), in the quarter where he bad sought seclusion before. By this time he bad ceased to devote himself to pure mathematics, and in company with his friends Mersenne and Mydorpe was deeply interested in the theory of the refraction of light, and in the practical work of grinding glasses of the best shape suitable for optical instruments. But all the while his aim was fixed on something beyond either mathematics or physics; he was engaged with reflections on the nature of man, of the soul, and of God; and it need cause no surprise that Descartes for a while remained invisible even to his most familiar friends. But their importance made a hermitage in Paris impossible, and a graceless friend surprised the philosopher in bed at 11 o'clock in the morning meditating on some problem, and occasionally taking notes. In disgust at the apparent hopelessness of the position for a student, Descartes started for the west to take part in the siege of La Rochelle, and entered the famine-stricken city with the victorious troops on the 30th October 1628. A meeting at which he was present after his return to Paris decided his vocation. He had acquired an opinion that the true art of memory was not to be gained by technical devices, but by a philosophic apprehension of things, and the Cardinal de Bérulle, the founder of the Congregation of the Oratory, was so struck by the tone of the remarks as to impress upon the speaker the duty of spending his life in the examination of truth. Descartes accepted the philosophic mission. In the end of 1628 he left Paris, and in the spring of 1629 he settled in Holland. His financial affairs he had intrusted to the care of the Abbé Pecot, and as his literary and scientific representative he adopted Père Mercure.

Between the ages of thirty-three and fifty-three (1629-1649) Descartes lived almost entirely in Holland. There only did he revisit France during that period—in 1644, 1647, and 1648. The first of these occasions was in order to settle family affairs after the death of his father in 1640. The eldest brother seems to have been disposed to take all he could, and to have expected the philosopher to be yielding in money matters. So little notice did the family think it necessary to take of a brother who had sunk to the level of literature, that a letter of René to his father, affectionately excusing his long absence, received a cold and curt answer. Reunies only after that father was lying in the tomb. The second brief visit, in 1647, partly on literary, partly on family business, was signalized by the award of a pension of 3000 francs, obtained from the royal bounty by Cardinal Mazarin in consideration of the advantages which Descartes's investigations conferred upon mankind, and to aid him in continuing his experiments. The pension was punctually paid. The last visit in 1648 was less fortunate. A royal order summoned him to France for new honours—a additional pension and a permanent post—for his fame had by this time gone abroad, and it was the age when princes sought to attract genius and learning to their courts. But when Descartes arrived, he found Paris rent asunder by the civil war of the Fronde. He paid the costs of his royal parchments, and left for his Dutch home without a word of reproach. The only other occasions on which he was out of the Netherlands were in 1630, when he made a flying visit to England to observe for himself some alleged magnetic phenomena, and in 1634, when he took an excursion to Denmark.

During his residence in Holland he lived at thirteen different places, and changed his abode twenty-four times. In the choice of these spots two motives seem to have influenced him—the neighbourhood of a university or college, and the amenities of the situation. Franeker, one of the nearest towns in Friesland, was the seat of a university founded in 1585, Hardewyke contained a venerable gymnasium, of some note in the physical sciences and theology, Deventer possessed a seminary still well endowed, but less famous than it had been in the days of Erasmus, 1 Utrecht acquired a university so late as 1634, and Leyden had a notable one founded in 1575. Amersfoort, where he also lived, seems to have been connected with a love affair,—the only one in his life; at least it was there that his daughter Francine died in 1640, at the age of five. Amsterdam, where he often lodged, Leiden in Friesland, and Dort were also residences. He once settled near Utrecht, as well as in the town, but the three spots which seem to have most attracted were—Engeest, a country house more than a mile north-west of Leyden, of which Schaefer has given a pleasing description in one of his letters, and the two villages of Egmond op den Hoof and Egmond the Abbey, situated between Zandam and the sea, in one of the prettiest localities of North Holland.

The time thus spent seems to have been on the whole happy, even allowing for some warm discussions with the mathematicians and metaphysicians of France, and for some harshest controversies. In the true art of memory was not to be gained by technical devices, but by a philosophic apprehension of things, and the Cardinal de Bérulle, the founder of the Congregation of the Oratory, was so struck by the tone of the remarks as to impress upon the speaker the duty of spending his life in the examination of truth. Descartes accepted the philosophic mission. In the end of 1628 he left Paris, and in the spring of 1629 he settled in Holland. His financial affairs he had intrusted to the care of the Abbé Pecot, and as his literary and scientific representative he adopted Père Mercure.

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over the whole period, and are particularly frequent in the latter half. The majority of them are addressed to Mersenne, and deal with problems of physics and musical theory (in which he took a special interest). Mathematical subjects are a common topic. Several letters between 1643 and 1649 are addressed to the Princess Elizabeth, the eldest daughter of the exiled elector palatine, who lived at the Hague, where her mother maintained the semblance of a royal court. The princess was obliged to quit Holland, but kept up a philosophical correspondence with Descartes. It is to her that the Principles of Philosophy were dedicated; and in her alone, according to Descartes, were united those generally separated talents for metaphysics and for mathematics which are so characteristically co-operative in the Cartesian system. Two Dutch friends, Zuychem, the father of the more celebrated Huyghens, and Hoogheiland, figure amongst the correspondents, not to mention various savants, professors, and churchmen (particularly Jesuits).

In many ways the Netherlands fell on the most prosperous and brilliant days of the Dutch state, under the stadtholdership of Frederick Henry (1625–1647). Abroad its navigators monopolized the commerce of the world, and explored unknown seas; at home the Dutch school of painting reached its acme in Rembrandt (1607–1669); and the philosophical reputation of the country was sustained by Grotius, Vossius, and the elder Hennius. And yet, though Rembrandt’s Nightwatch is dated the very year after the publication of the Meditations, not a word in Descartes’ breathes of any work of art or historical learning. The contemplation of aesthetics and erudition is characteristic of the most typical members of the Cartesian school, especially Malebranche. Though Descartes probably read more than some of his admirers supposed he was not in any strict sense a reader. His wisdom grew mainly out of his own reflections and experiments, calmly yet ceaselessly pursued. Of more learning and scholarship he had no esteem. The story of his disgust, when he found that Queen Christina devoted some time every day to the study of Greek under the tuition of Vossius, is at least true in substance. It gives no evidence of science, he remarks, to possess a tolerable knowledge of the Roman tongue, such as once was possessed by the populace of Rome. In all his travels, and in the different places at which he settled, his interest seems untouched either by art or history, he looks only to the phenomena of nature and the actual aspects of human life. He was a spectator rather than an actor on the stage of the world. If he entered the army, it was merely because the position gave a vantage-ground from which to make his observations. In the political interests which these contests involved he took no part; his favourite disciple, the Princess Elizabeth, was the daughter of the banished king, against whom he had served in Bohemia; and Queen Christina, his second royal follower, was the daughter of Gustavus Adolphus.

Descartes is a type of that self-reliant, harsh, and abstract spirit of science to which erudition and all the heritage of the past seem but elegant and unworthy trifling. The science of Descartes was physics in all its branches, but especially as applied to physiology. Science, he says, may be compared to a tree; metaphysics is the root, physics is the trunk, and the three chief branches are mechanics, medicine, and morals,—the three applications of our knowledge to the outward world, to the human body, and to the conduct of life.

Such then was the work, and such the ends, that Descartes had in view in Holland. His residence was generally divided into two parts—one his workshop for science, the other his reception-room for society. “Here are my books,” he is reported to have told a visitor, as he pointed to the animals he had dissected. “I am now,” he writes in 1630, “studying chemistry and anatomy together; and every day I learn something which I could not find in books.” He was working hard at his book on refraction, and at the same time busily dissecting the heads of different animals in order to explain imagination and memory, which he considers physical processes. It need not from this be supposed that Descartes was a laborious student. “I can say with truth,” he writes to the Princess Elizabeth, “that the principle which I have always observed in my studies, and which I believe has helped me most to gain what knowledge I have, has been never to spend beyond a very few hours daily in thoughts which occupy the imagination, and a very few hours yearly in those which occupy the understanding, and to give all the rest of my time to the relaxation of the senses and the repose of the mind.” But his work and his life must have been full of excitement and interest.

Its subject was the Cartesonian system. Two Dutch mathematics which are so characteristically cooperative, and the whole period, and are particularly frequent in the latter half. The majority of them are addressed to Mersenne, and deal with problems of physics and musical theory (in which he took a special interest). Mathematical subjects are a common topic. Several letters between 1643 and 1649 are addressed to the Princess Elizabeth, the eldest daughter of the exiled elector palatine, who lived at the Hague, where her mother maintained the semblance of a royal court. The princess was obliged to quit Holland, but kept up a philosophical correspondence with Descartes. It is to her that the Principles of Philosophy were dedicated; and in her alone, according to Descartes, were united those generally separated talents for metaphysics and for mathematics which are so characteristically co-operative in the Cartesian system. Two Dutch friends, Zuychem, the father of the more celebrated Huyghens, and Hoogheiland, figure amongst the correspondents, not to mention various savants, professors, and churchmen (particularly Jesuits).

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which he glanced through in his usual manner with other men's books; he found it good, and, "failing more in the points where it follows received opinions than where it diverges from them.") The consequence of these reports of the hostility of the church to the doctrine on which his theory reposed led him to abandon all thoughts of publishing it. The World was consigned to his desk, and although doctrines in all essential respects the same constitute the physical portion of his Princips, it was not till after the death of Descartes that fragments of the work, including Le Monde, or a treatise on light, and the physiological tracts L'Homme and La Formation du Fetus, were given to the world by Clerelcher, in 1664. Descartes was not disposed to be a martyr; he had a sincere respect for the church and for authority, and had no wish to shock prejudices, or to begin an open conflict with established doctrines.

In 1636 Descartes had resolved to publish some specimens of the fruits of his method, and some general observations on its nature which, under an appearance of simplicity, naught saw the apparent of more adequate ideas on the world and man "I should be glad," he says, when talking of a publisher, "if the whole book were printed in good type, on good paper, and I should like to have at least 200 copies for distribution. The book will contain four essays, all in French, with the general title of Projet d'un Universal Science, capable of raising our nature to its highest perfection; also Driptees, Meteors, and Geometry, wherein the most curious matters which the author could select as a proof of the universal science which he pro-

posses are explained in such a way that even the unlearned may understand them."

The work appeared anonymously at Leyden (published by Jean Maire) in 1637, under the modest title of Essais Philosophiques; and the project of a universal science becomes the Discours de la méthode pour bien conduire sa raison et chercher la vérité dans les sciences. In 1644 it appeared in a Latin version, revised by Descartes, as Specimen Philosophiae. A work so widely circulated by the author naturally attracted attention, but in France it was principally the mathematicians who took it up, and their criticisms were more pungent than complimentary. Format, Roberval, and Desargues took exception in their various ways to the methods employed in the geometry, and to the demonstrations of the laws of refraction given in the Driptees and the Meteors. The dispute on the latter point between Format and Descartes was continued, even after the philosopher's death as an argument for the views of the youthful Dutch university the effect of the Cartesian essays was greater.

The first public teacher of Cartesian views was Henri René, a Belgian, who at Deventer and afterwards at Utrecht had introduced the new philosophy which he had learned from personal intercourse with Descartes. René only survived five years at Utrecht; and it was reserved for Regius (Henri De Roy),—who in 1638 had been appointed to the new chair of botany and theoretical medicine at Utrecht, and who visited Descartes at Egmond in order more thoroughly to learn his views,—to throw down the gauntlet to the adherents of the old methods. With more eloquence and vigour than judgment or prudence, he pro-
pounded and defended these bringing into prominent relief the points in which the new doctrines clashed with the old. The attack was opened by Gilbert Voet, foremost among the theological professors and clergy of Utrecht, a preacher of null and a stronghold of orthodoxy. In 1639 he published a series of arguments against atheism, in which the Cartesian views were not obscurely indicated as probable for the faith, though no name was mentioned. Next year he

persuaded the magistracy to issue an order forbidding Regius to travel beyond the received doctrine, for Regius, contrary to the advice of Descartes, had formulated his view of Cartesiansm in the phrase that man was a unity merely by accident, and meddled in his lectures with topics not usually associated with the study of medicine. The magisterial views seem to have prevailed in the pro-

fessorate, which formally in March 1642 expressed its disapproval of the new and pretended philosophy as well as of its expositors. As yet Descartes was not directly attacked; Voet now issued, through the medium and under the name of Martin Schoock, one of his pupils, a pamphlet with the title of Methodes some philosophe Renarts Descartes, in which atheism and infidelity were openly declared to be the effect of the new teaching. Descartes replied to Voet directly in a long and vigorous letter, published at Amster-

dam in 1643. Yet notwithstanding, he was summoned before the magistrates of Utrecht to defend himself against charges of irreligion and slander. What might have happened we cannot tell, but Descartes threw himself on the protection of the French ambassador and the prince of Orange, and the city magistrates, from whom he vaguely demanded satisfaction in a dignified letter, were snubbed by their superiors. About the same time (April 1645) Schoock was summoned before the university of Groningen, of which he was a member, and forthwith disavowed the more abusive passages in his book. So did the effects of the oedoes theoloeum, for the meanwhile at least, die away.

In the Discourse of Method Descartes had sketched the main points in his new views, with a mental autobiography which might explain their origin, and with some suggestions as to their applications. His second great work, Meditations on the First Philosophy, which had been begun soon after his settlement in the Netherlands, expanded in more detail the foundations of his system, laying especial emphasis on the priority of mind to body, and on the absolute and ultimate dependence of mind as well as body on the existence of God. In 1646 a copy of the work in manuscript was despatched to Paris, and Mersenne was requested to lay it before as many thinkers and scholars as he deemed desirable, with a view to getting their views upon its argument and doctrine. Mersenne was not slack in submitting the work to criticism, and Descartes soon had a formidable list of objections to reply to. Accordingly, when the work was published at Paris in August 1641, under the title of Philosophia medii aelioris et aenima immortalitatis (though it was in fact not the immortality, but the immateriality of the mind, or, as the second edition described it, anima humanae a corpore distincta, which was maintained), the title went on to describe the larger part of the book as containing various objections of learned men, with the replies of the author. These objections in the first edition are arranged under six heads,—the first came from Cates, a thelogian of Louvain, the second and sixth are anonymous criticisms from various hands, whilst the third, fourth, and fifth belong respectively to Hobbes, Arnauld, and Gassendi. In the second edition appeared the seventh—objections from Père Bourdin, a Jesuit teacher of mathematics in Paris; and subsequently another set of objections known as those of Hyperaspates, was included in the collection of Descartes's letters. The anonymous objections are very much the statement of common sense against philosophy; those of Cates criticise the Cartesian argument from the traditional theology of the church, those of Arnauld are an appreciative inquiry into the bearings and consequences of the meditations for religion
and morality; while those of Hobbes and Gassendi—both somewhat senior to Descartes—and with a dogmatic system of their own already formed—are a keen assault upon the spiritualism of the Cartesian position from a generally “sensational” standpoint. The criticisms of the last two are the criticisms of a hostile school of thought; those of Arnauld are the difficulties of a possible disciple. 

In 1644 the third great work of Descartes, the Principia Philosophiae, appeared at Amsterdam. Passing briefly over the conclusions arrived at in the Meditationes, it deals in its second, third, and fourth parts with the general principles of physical science, especially the laws of motion, with the theory of vortices, and with the phenomena of heat, light, gravity, magnetism, electricity, &c., upon the earth. This work exhibits some curious marks of caution. Undoubtedly, says Descartes, the world was in the beginning created in all its perfection. “But yet as it is best, if we wish to understand the nature of plants or of men, to consider how they may by degrees proceed from seeds, rather than how they were created by God in the beginning of the world, so, if we can excavitate some extremely simple and comprehensible principles, out of which, as if they were seeds, we can prove that stars, and earth, and all these visible scenes could have originated, although we know full well that they never did originate in such a way, we shall in that way expound their nature far better than if we merely described them as they exist at present.” The Copernican theory is rejected in name, but retained in substance. The earth, or other planet, does not actually move round the sun, yet it is carried round the sun in the subtle matter of the great vortex, where it lies in the same position—it carried like the passenger in a boat, who may cross the sea and yet not rise from his berth.

In 1647 the difficulties that had arisen at Utrecht were repeated on a smaller scale at Leyden. Thers the Cartesian innovations had found a patron in Adrian Heerebord, and were openly discussed in the Meditations: an attempt to prove the existence of God savoured, as they thought, of atheism and heresy. When Descartes complained to the authorities of this unfair treatment, the only reply was an order by which all mention of the name of Cartesianism, whether favourable or otherwise, was forbidden in the university. Thus was scarcely what Descartes wanted, and again he had to apply to the prince of Orange, whereupon the theologians were asked to behave with civility, and the name of Descartes was no longer proscribed. But other annoyances were not wanting from unfaithful disciples and unsympathetic critics. The Instauratio of Gassendi appeared at Amsterdam in 1644 as a reply to the reply which Descartes had published of his previous objections; and the publication by Regius of his work on Physical Philosophy gave the world to understand that he had ceased to be a thorough adherent of the philosophy which he had so enthusiastically adopted.

It was about 1643 that Descartes lost his friends Mersenne and Mydorge by death. The place of Mersenne as his Parisian representative was in the main taken by Claude Clerselier (the French translator of the Objections and Responses), whom he had become acquainted with in Paris. Through Clerselier he came to know Pierre Chanut, who in 1645 was sent as French ambassador to the court of Sweden. Queen Christina, the daughter of the great Gustavus, was not yet twenty, and took a lively, if somewhat whimsical interest in literary and philosophical culture. Through Chanut, with whom she was on terms of familiarity, she came to hear of Descartes, and a correspondence which the latter nominally carried on with the ambassador was in reality intended for the eyes of the queen. The correspondence took an ethical tone. It began with a long letter on Love in all its aspects (February 1647), a topic suggested by Chanut, who had been discussing it with the queen; and this was soon followed by another to Christina herself on the Chief Good. An essay on the Passions of the Mind (Passiones de l’Âme), which had been written originally for the Princess Elizabeth, in development of some ethical views suggested by the De Vita Beata of Seneca, was inscribed at the same time for Chanut. It was a draft of the work published in 1650 under the same title. Philosophy, particularly that of Descartes, was becoming a fashionable divertissement for the queen and her courtiers, and it was felt that the presence of the sage himself was necessary to complete the good work of education. An invitation to the Swedish court was urged upon Descartes, and after much hesitation accepted; a vessel of the royal navy was ordered to wait upon him, and in September 1649 he left Egmond for the north.

The position on which he entered at Stockholm was certainly no sincere, and utterly unsuited for a man who had always tried to be his own master. The young queen, full of plans and energy, desired Descartes to draw up a code for a proposed academy of the sciences, and to give her an hour of philosophic instruction every morning at five. And in order to tie him down to the country she had already determined to create him a noble, and begun to look out an estate in the lately annexed possessions of Sweden on the Pomeranian coast. But these things were not to be. His friend Chanut fell dangerously ill; and Descartes, who devoted himself to attend in the sick-room, was obliged to issue from it every morning in the chill northern air of January, and spend an hour in the palace library. The ambassador recovered, but Descartes fell a victim to the same disease—an inflammation of the lungs. The last time he saw the queen was on the 1st of February 1650, when he handed to her the statutes he had drawn up for the proposed academy. Ten days after he was dead. The queen, in her first grief and enthusiasm, would have liked to bury him grandly at the feet of the Swedish kings, and to raise a costly mausoleum in his honour; but these plans were overruled, and a plain monument in the Catholic cemetery was all that marked the place of his rest. Sixteen years after his death the French treasurer D’Alibert made arrangements for the conveyance of the ashes to his native land; and in 1667 they were interred in the church of St Genevieve du Mont, the modern Panthéon. In 1819, after being temporarily deposited in a stone sarcophagus in the court of the Louvre during the Revolutionary epoch, they were transferred to St Germain-des-Prés, where they now repose between Montfaucon and Mabillon. A monument was raised to his memory at Stockholm by Gustavus III; and some years ago a statue was erected to him at Tours, with the inscription Je pense, donec. Descartes was never married, and probably had little of the amorous in his temperament. He has alluded to a childish fancy for a young girl with a slight obliquity of vision; but he only mentions it a propos of the consequent weakness which led him to associate such a defect with beauty. Mythical rumours represent him as telling his belle that he found no beauty comparable to the beauty of truth. In person he was a little man, with large head, projecting brow, prominent nose, and eyes wide apart, with black hair coming down almost to his eyebrows. His voice was feeble. He usually dressed in black, with unobtrusive propriety.

1 Princip. L. III. S 45. 2 Crit. X. 26. 3 Crit. X. 3. 4 Crit. X. 53.
The end of all study, says Descartes in one of his earliest writings, ought to be to guide the mind to form true and sound judgments on every thing that may be presented to it. The sciences in their totality are but the intelligence of man; and all the details of knowledge have no value save as they strengthen the understanding. The mind is not for the sake of knowledge, but knowledge for the sake of the mind. This is the re-assertion of a principle which the Middle Ages had lost sight of—that knowledge, if it is to have any value, must be intelligence, and not erudition.

But how is intelligence, as opposed to erudition, possible? The answer to that question is the method of Descartes. That idea of a method grew up with his study of geometry and arithmetic, the only branches of knowledge which he would allow to be "made sciences," those which the Jesuits best taught, and which he himself cultivated most zealously in early life. But they did not satisfy his demand for intelligence. "I found in them," he says, "different propositions on numbers of which, after a calculation, I perceived the truth; as for the figures, I had, so to speak, many truths put before my eyes, and many others concluded from them by analogy; but it did not seem to me that they told my mind with sufficient clearness why the things were as I was shown, and by what means their discovery was attained." The mathematics of which he thus speaks included the geometry of the ancients, as it had been handed down to the modern world, and arithmetic with the developments it had received in the direction of algebra. The ancient geometry, as we know it, is a wonderful monument of ingenuity—a series of "tour de force," in which each problem to all appearance stands alone, and, if solved, is solved by methods and principles peculiar to itself. Here and there particular curves, for example, had been obliged to yield the secret of their tangent; but the ancient geometers apparently had no consciousness of the general bearings of the methods which they so successfully applied. Each problem was something unique; the elements of transition from one to another were wanting, and the next step which mathematicians to make was to find some method of reducing, for instance, all curves to a common notation. When that was found, the solution of one problem would immediately entail the solution of all others which belonged to the same series as itself.

The arithmetical half of mathematics, which had been gradually growing into algebra, and had decidedly entered itself as such in the Logistica Sicciana of Vieta (1540-1603), supplied to some extent the means of generalizing geometry. And the algebraists or mathematicians of the 16th century, such as Lucas de Borgo, Cardan, and Tartaglia, had used geometric constructions to throw light on the solution of particular equations. But progress was made difficult, in consequence of the clumsy and irregular nomenclature employed. With Descartes the use of exponents as now employed for denoting the powers of a quantity becomes systematic; and without some such step by which the homogeneity of successive powers at once recognized, the binomial theorem could scarcely have been detected. The restriction of the early letters of the alphabet to known, and of the late letters to unknown quantities was also his work. In this and other details he crowns and completes, in a form henceforth to be dominant for the language of algebra, the work of numerous obscure predecessors, such as Etienne de la Roche, Stiefel, and others.

Having thus perfected the instrument, his next step was to apply it in such a way as to bring uniformity of method into the isolated and independent operations of geometry."

1 Regulae, III. 202.
2 Regulae, III. 219.
3 I had no intention," he says in the Method,
4 Desc. de Methodo, part ii.
5 Geometria, book iii.
7 Opera, xi. 224.
another. In every such series or group there is a dominant element, simple and irresoluble, the standard on which the rest of the series depends, and hence, so far as that group or series is concerned, absolute. The other members of the group are relative and dependent, and only to be understood as in various degrees subordinate to the primitive conception. The character of the direct antithesis to the scepticism of Montaigne and Pascal, to the materialism of Gassendi and Hobbes, and to the superstitious anthropomorphism which defaced the reawakening sciences of nature. Descartes laid down the lines on which modern philosophy and science were to build. But himself no trained metaphysician, and unsuspicious of the lesions of history, he gave a hint to the fundamental elements in a series as its intuitive or self-evident character; it is given by "the evident conception of a healthy and attentive mind so clear and distinct that no doubt is left." Having discovered this prime or absolute member of the group, we proceed to consider the degree in which the other members enter into relation with it. Here deduction comes into play to show the dependence of one term upon the others; and, in the case of a long chain of intervening links, the problem for intelligence is so to enumerate every element, and so to repeat the connection that we may finally grasp all the links of the chain in one. In this way we, as it were, bring the causal or primal term and its remotest dependent immediately together, and raise a derivative knowledge into one which is primary and intuitive. Such are the four points of Cartesian method:—(1) Truth requires a clear and distinct conception of its object, excluding all doubt; (2) the objects of knowledge naturally fall into series or groups; (3) in these groups investigation must begin with a simple and indecomposable element, and pass from it to the more complex and relative elements; (4) an exhaustive and immediate grasp of the relations and interconnection of these elements is necessary for knowledge in the fullest sense of that word.

"There is no question," he says in anticipation of Locke and Kant, "more important to solve than that of knowing what human knowledge is and how far it extends." "This is a question which ought to be asked at least once in their lives by all who seriously wish to gain wisdom. The inquirer will find that the first thing to know is intellect, because on it depends the knowledge of all other things. Examining next what immediately follows the knowledge of pure intellect, he will pass in review all the other means of knowledge, and will find that they are two (or three), the imagination and the senses (and the memory). He will therefore devote all his care to examine and distinguish these three means of knowledge; and seeing that truth and error can, properly speaking, be only in the intellect, and that the two other modes of knowledge are only occasions, he will carefully avoid whatever can lead him astray." 3 This separation of intellect from sense, imagination, and memory is the cardinal precept of the Cartesian logic; it marks off clear and distinct (s. a. adequate and vivid) from obscure, fragmentary, and incoherent conceptions.

The Discourse of Method and the Meditations apply what the Rules for the Direction of the Mind had regarded as particular instances to our conceptions of the world as a whole. They propose, that is, to find a simple and indecomposable point, or absolute element, which gives to the world and thought their order and systematization. The grandeur of this attempt is perhaps unequalled in the annals of philosophy. The three main steps in the argument are the versatility of our thought when that thought is true to itself, the inevitable uprising of thought from its fragmentary aspects in our habitual consciousness to the infinite and perfect existence which God is, and the ultimate reduction of the material universe to extension and local movement. These are the central dogmas of logic, metaphysics, and physics, from which start the subsequent inquiries of Locke, Leibnitz, and Newton. They are also the direct antitheses to the scepticism of Montaigne and Pascal, to the materialism of Gassendi and Hobbes, and to the superstitious anthropomorphism which defaced the reawakening sciences of nature. Descartes laid down the lines on which modern philosophy and science were to build. But himself no trained metaphysician, and unsuspicious of the lesions of history, he gave a hint to the fundamental elements in a series as its intuitive or self-evident character; it is given by "the evident conception of a healthy and attentive mind so clear and distinct that no doubt is left." Having discovered this prime or absolute member of the group, we proceed to consider the degree in which the other members enter into relation with it. Here deduction comes into play to show the dependence of one term upon the others; and, in the case of a long chain of intervening links, the problem for intelligence is so to enumerate every element, and so to repeat the connection that we may finally grasp all the links of the chain in one. In this way we, as it were, bring the causal or primal term and its remotest dependent immediately together, and raise a derivative knowledge into one which is primary and intuitive. Such are the four points of Cartesian method:—(1) Truth requires a clear and distinct conception of its object, excluding all doubt; (2) the objects of knowledge naturally fall into series or groups; (3) in these groups investigation must begin with a simple and indecomposable element, and pass from it to the more complex and relative elements; (4) an exhaustive and immediate grasp of the relations and interconnection of these elements is necessary for knowledge in the fullest sense of that word.

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1 Chtevres, v. 212. 2 Disc. de M6thod6, part ii. 3 Chtevres, vi. 243. 4 Chtevres, v. 281.
extension, and sustains that motion from moment to
moment, and in the same way the force of mind has really
been concentrated in God. Every moment one expects
to find Descartes saying with Hobbes that man’s thought
has created God, or with Spinoza and Malebranche that it
is God who really thinks in the apparent thought of man.
After all, the metaphysical theology of Descartes, however
essential in his own eyes, serves chiefly as the ground for
constructing his theory of man and of the universe.
Descartes regards matter as uniform in character

1 Cutses, vi. 222. 2 Cutses, vi. 109.
Throughout the universe; he anticipated, as it were, from the grand and theoretical ground, the revelations of spectrum analysis as applied to the sun and stars. We have then to think of a full universe of matter (and matter—extension) divided and figured with endless variety, and set (and kept) in motion by God, and any sort of division, figure, and motion will serve the purposes of our supposition as well as another. "Scarcely any supposition," 1 he says, in ominous language, "can be made from which the same result, though possibly with greater difficulty, might not be deduced by the same laws of nature; for since, in virtue of these laws, matter successively assumes all the forms of which it is capable, if we consider these forms in order, we shall at one point or other reach the existing form of the world, so that no error need here be feared from a false supposition." As the movement of one particle in a closely-packed universe is only possible if all other parts move simultaneously, so that the last in the series steps into the place of the first; and as the fineness and division of these particles varies in each point in the universe, there will inevitably at the same instant result throughout the universe an innumerable host of more or less circular movements, and of vortices or whirlpools of material particles, varying in size and velocity. Taking for convenience a limited portion of the universe, we observe that in consequence of the circular movement the particles of matter have their corners pared off by rubbing against each other; and two species of matter thus arise—one consisting of small globules which continue their circular motion with a (centrifugal) tendency to fly off from the centre as they swing round the axis of rotation, while the other, consisting of the fine dust—the filings and parings of the original particles—gradually becoming finer and finer, and losing its velocity, tends (centripetally) to accumulate in the centre of the vortex, which has been gradually left free by the receding particles of globular matter. This finer matter which collects in the centre of each vortex is the first matter of Descartes—it constitutes the sun or star. The spherical particles are the second matter of Descartes, and their tendency to propel one another from the centre in straight lines towards the circumference of each vortex is what gives rise to the phenomenon of light radiating from the central star. This second matter is atmosphere or firmament, which envelops and revolves around the central accumulation of first matter.

A third form of matter is produced from the original particles. As the small filings produced by friction seek to pass through the interstices between the rapidly revolving spherical particles in the vortex, they are detained and become twisted and channelled in their passage, and when they reach the edge of the inner ocean of solar dust they settle upon it as the froth and foam produced by the agitation of water gathers upon its surface. These form what we term spots in the sun. In some cases they come and go, or dissolve into an ether round the sun; but in other cases the density and division of matter forms in such a crust round the central nucleus. In course of time the star, with its expansive force diminished, suffers encroachments from the neighbouring vortices, and at length they catch it up. If the velocity of the decaying star be greater than that of any part of the vortex which has swept it up, it will ere long pass out of the range of that vortex, and continue its movement from one to another. Such a star is a comet. But in other cases the encrusted star settles in that portion of the revolving vortex which has a velocity equivalent to its own, and so continues to revolve in the vortex, w rapt in its own firmament. Such a reduced and impoverished star is a planet; and the several planets of our solar system are the several vortices which from time to time have been swept up by the central sun-vortex. The same considerations serve to explain the moon and other satellites. They, too, were once vortices, swallowed up by some other, which at a later day fell a victim to the sweep of our sun.

Such is the mere outline is the celebrated theory of vortices, which for about 20 years after its promulgation received supreme in science, and for much longer time opposed a tenacious resistance to rival doctrines. It is one of the grandest hypotheses which ever have been formed to account by mechanical processes for the movements of the universe. While chemistry rests in the acceptance of ultimate heterogeneous elements, the vortex-theory assumed uniform matter through the universe, and reduced cosmical physics to the same principles as regulate terrestrial phenomena. It ended the old Aristotelian distinction between the sphere beneath the moon and the starry firmament beyond. It banished the hypothesis of a central fire, even Kepler had assigned the guardianship of the planetary movements; and, if it supposes the globular particles of the envelopes to be the active force in carrying the earth round the sun, we may remember that Newton himself assumed an ether for somewhat similar purposes. The great argument on which the Cartesians founded their opposition to the Newtonian doctrines was that attraction was an occult quality, not wholly intelligible by the aid of mere mechanics. The Newtonian theory is an analysis of the elementary movements which in their combination determine the planetary orbits, and gives the formula of the proportions according to which they act. But the Cartesian theory, like the later speculations of Kant and Laplace, proposes to give a hypothetical explanation of the circumstances and motions which in the normal course of things led to the state of things required by the law of attraction. In the judgment of D'Alembert the Cartesian theory was the best that the observations of the age admitted; and "its explanation of gravity was one of the most ingenious hypotheses which philosophy ever imagined." That the explanation fails in detail is undoubted: it does not account for the ellipticity of the planets; it would place the sun, not in one focus, but in the centre of the ellipse; and it would make gravity directed towards the centre under the equator. But these defects need not blind us to the fact that this hypothesis made the mathematical progress of Hooke, Boyle, and Newton much more easy and certain. Descartes professedly assumed a simplicity in the phenomena which they did not present. But such a hypothetical simplicity is the necessary step for solving the more complex problems of nature. The danger lies not in forming such hypotheses, but in regarding them as final, or as more than an attempt to throw light upon our observation of the phenomena. In doing what he did, Descartes actually exemplified that reduction of the processes of nature to mere transposition of the particles of matter, which in different ways was a leading idea in the minds of Bacon, Hobbes, and Gassendi. The defects of Descartes lie rather in his apparently imperfect apprehension of the principle of movements uniformly accelerated which his contemporary Galileo had illustrated and insisted upon, and in the indistinctness which attaches to his views of the transmission of motion in cases of impact. In modern times, it may be added, a theory of vortex-atoms has been suggested to explain the constitution of matter. But except in name it has but slight analogy with Cartesian doctrine, and finds a parallel, if anywhere, in a modification of that doctrine by Malebranche. Besides the last two parts of the "Principles of Philosophy," the physical writings of Descartes include the "Dioptrics."
and Meteors, as well as passages in the letters. His optical investigations are perhaps the subject in which he most contributed to the progress of science, and the lucidity of exposition which marks his Dioptrics stands conspicuous even amid the generally luminous style of his works. Its object is a practical one, to determine by scientific considerations the shape of lens best adapted to improve the capabilities of the telescope, which had been invented not long before. The conclusions at which he arrives have not been so useful as he unsuspected, in consequence of the mechanical difficulties. But the investigation by which he reaches them has the merit of first prominently publishing and establishing the law of the refraction of light. Attempts have been made, principally founded on some jealous remarks of Huyghens, to show that Descartes had learned the principles of refraction from the manuscript of a treatise by Willebrord Snell, but facts do not bear out the charge; and, so far as Descartes founds his optics on any one, it is on the researches of Kepler. In case the glory of the discovery is to a large extent his own, for his proof of the law is founded upon the theory that light in the tendency or inclination of the subtile particles of ether Ia forced by the sun or luminous body to the eye. And thus he approximates to the wave theory of light, though he supposed, like his contemporaries, that the transmission of light was instantaneous. The chief of his other contributions to optics was the explanation of the rainbow—an explanation far from complete, since the unequal refrangibility of the rays of light was yet undiscovered—but a decided advance upon his predecessors, notably on the De radiis visum et lucum (1611) of Marc-Antoine de Dominus, archbishop of Spalato, from whom careless critics have assumed that he derived his ideas.

If Descartes had contented himself with thus explaining the phenomena of gravity, heat, magnetism, light, and similar forces by means of the molecular movements of his vortices, even such a theory would have excited admiration by its daring grandeur. But Descartes did not stop short in the region of what is usually termed physics. Chemistry and biology are alike swallowed up in the one science of physics, and reduced to a problem of mechanism. This theory, he believed, would afford an explanation of every phenomenon whatever, and in nearly every department of knowledge he has given specimens of its power. But the most remarkable and daring application of the theory was to account for the phenomena of organic life, especially in animals and man. If we possessed a thorough knowledge, he says, of all the parts of the seed of any species of animal (e.g., man), we could from that alone, by reasons entirely mathematical and certain, deduce the whole figure and conformation of each of its members, and, conversely, if we knew several peculiarities of this conformation, we could from this deduce the nature of its seed.

The organism in this way is regarded as a machine, constructed from the particles of the seed, which in virtue of the laws of motion have arranged themselves (always under the governing power of God) in the particular animal shape in which we see them. The doctrine of the circulation of the blood, which Descartes adopted from Harvey, supplied additional arguments in favour of his mechanical theory, and he probably did much to popularize the discovery. A fire without light, compared to the heart which gushers in a haystack when the hay has been stove, properly dry—heat, in short, as an agitation of the particles—is the motive cause of the contraction and dilatations of the heart. These finer particles of the blood which become extremely rarefied during this process pass off in two directions—one portion, and the least important in the theory, to the organs of generation, the other portion to the cavities of the brain. There not merely do they serve to nourish the organs, they also give rise to a fine ethereal flame or wind through the action of the brain upon them, and thus form the so-called “animal spirits.” From the brain these spirits are conveyed through the body by means of the nerves, regarded by Descartes as tubular vessels, resembling the pipes conveying the water of a spring to act upon the mechanical appliances in an artificial fountain. The nerves conduct the animal spirits to act upon the muscles, and in their turn convey the impressions of the organs to the brain.

Man and the animals as thus described are compared to automata, and termed machines. The vegetative and sensitive souls which the Aristotelians had introduced to break the leap between inanimate matter and man are ruthlessly swept away, only one soul, the rational, remains, and that is restricted to man. One hypothesis supplants the various principles of life, the rule of absolute mechanism is as complete in the animal as in the cosmos. Reason and thought, the essential quality of the soul, do not belong to the brutes, there is an impassable gulf fixed between man and the lower animals. The only sure sign of reason is the power of language—the, of giving expression to general ideas, and language in that sense is not found save in man. The cries of animals are but the working of the curiously-contrived machine, in which, when one portion is touched in a certain way, the wheels and springs concealed in the interior perform their work, and it may be, a note supposed to express joy or pain is evolved, but there is no consciousness or feeling. "The animals act naturally and by springs, like a watch," "The greatest of all the prejudices we have retained from our infancy is that of believing that the beasts think." If the beasts can properly be said to see at all, "they see as we do when our mind is distracted and keenly applied elsewhere, the images of outward objects palliate themselves on the retina, and possibly even the impressions made in the optic nerves determine our limbs to different movements, but we feel nothing of it all, and more as if we were automata." I will not believe, said the Cartesian Chanet, that a beast thinks until the beast itself says so itself. "The existence of the animal to the lash of his tyrant is not other than the sensibility of the plant to the influences of light and heat. It is not much comfort to learn further from Descartes that "he demes life to no animal, but makes it consist in the mere heat of the heart. Nor does he deny them feeling in so far as it depends on the bodily organs." Descartes, with an unusual fondness for the letter of Scripture, quotes oftener than once in support of this monstrous doctrine the dictum that "The blood is the life," and he remarks, with some sarcasm possibly, that it is a comfortable theory for the eaters of animal flesh. And the doctrine found acceptance among some whom it enabled to get rid of the difficulties raised by Montaigne and those who allowed more difference between animal and animal than between the higher animals and man. It also encouraged vivisection—a practice common with Descartes himself. The recluses of Port Royal seized it eagerly, discussed automatism, dissected living animals in order to show to a morbid curiosity the circulation of the blood, were careless of the cries of tortured dogs, and finally embalmed the doctrine in a syllabus of their logic.—No matter thinks: every soul of beast is matter: therefore no soul of beast thinks.

But whilst all the organic processes in man go on...
mechanically, and though by reflex action he may repel
attack unconsciously, still the first affirmation of the system
was that man was essentially a thinking being; and, while
we retain this original dictum, it must not be supposed that
the mind is a mere spectator, or like the boatman in
the boat. Of course a unity of nature is impossible between
minds and body so described; yet there is a union of
composition, a unity so close that the compound is "really
one and in a sense indivisible." You cannot in the actual
man cut soul and body asunder; they interpenetrate in
every member. But there is one point in the human
frame—a point midway in the brain, single and free, which
may in a special sense be called the seat of the mind.
This is the so-called pituitary, or pineal gland, where in a
minimized point the mind on one hand and the vital spirits
on the other meet and communicate. In that gland the
mystery of creation is concentrated, thought meets exten-
dion and directs it; extension moves towards thought and
is passed away. The case and distinct ideas, it seems, pro-
duce an absolute mystery. Mind, driven from the field of
extension, erects its last fortress in the pineal gland.
In such a state of despair and destitution there is no hope for
spiritualism, save in God; and Clauberg, Geulincx, and
Malebranche all take refuge under the shadow of His wings
to escape the tyranny of extended matter.
In the psychology of Descartes there are two fundamental
modes of thought,—perception and volition. "It seems
to me," he says, "that in receiving such and such an idea
the mind is passive, and that it is active only in volition;
that its ideas are put in it partly by the objects which touch
the senses, partly by the impressions in the brain, and
partly also by the dispositions which have preceded in the
mind itself and by the movements of its will." The will
therefore, as being more originative, has more to do with
true or false judgments than the understanding. Unfortu-
nately, Descartes is too lordly a philosopher to explain
distinctly what either understanding or will may mean.
But we gather that in two directions our reason is bound up
with bodily conditions, which make or mar it, according as
the will, or central energy of thought, is true to itself or not.
In the range of perception, intellect is subjected to the
material conditions of sense, memory, and imagination; and
in infancy, when the will has allowed itself to assent pre-
cipitately to the conjunctions presented to it by these
material processes, thought has become filled with obscure
ideas. In the moral sphere the passions or emotions (which
Descartes reduces to the six primitive forms of admiration,
love, hatred, desire, joy, and sadness) are the perceptions
or sentiments of the mind, caused and maintained by some
movement of the vital spirits, but specially referring to the
mind only. The presentation of some object of dread, for
example, to the eye has or may have a double effect. On
one hand the animal spirits "reflected" from the image
formed on the pineal gland proceed through the nervous
tubes to make the muscles turn the back and lift the feet,
so producing an emotion in the terror. Such is the reflex
and mechanical movement independent of the mind. But,
on the other hand, the vital spirits cause a movement in the
gland by which the mind perceives the affection of the
organs, learns that something is to be loved or hated,
adored or shunned. Such perceptions dispose the mind
to pursue what nature dictates as useful. But the estimate of
goods and evils which they give is indirect and unsatis-
factory. The office of reason is to give a true and distinct
appreciation of the values of goods and evils; or firm and
determinate judgments touching the knowledge of good
and evil are our proper arms against the influence of the
passions. We are free, therefore, through knowledge: ex
magna luce in intellectu sequitur magna prosperitas in volun-
tate, et omnia pecuniae omnia ignoscent. "If we clearly see
that what we are doing is wrong, it would be impossible for
us to sin, so long as we saw it in that light." Thus the
highest liberty, as distinguished from mere indifference,
proceeds from clear and distinct knowledge, and such
knowledge can only be obtained by5 reasoned and resolution,
"i.e., by the continued exercise of the will. Thus in the
perfection of man, as in the nature of God, will and intellect
must be united. For thought, will is as necessary as under-
standing. And innate ideas therefore are mere capacities or tendencies,—possibilities which apart from the
will to think may be regarded as nothing at all.

The philosophy of Descartes fought its first battles and
gained its first triumphs in the country of his adoption.
In his lifetime his views had been taught in Utrecht and
Leyden. In the universities of the Netherlands and of
Lower Germany, as yet free from the conservatism of the
old-established seats of learning, the new system gained an
easy victory over Aristotelianism, and, as it was adapted
for lectures and examinations, soon became almost as
scholastic as the doctrines it had supplanted. At Leyden,
taught by De Raey, Heerebord, Heidan, and Volder;
At Utrecht, by De Bruyn and P. Burmann, and Lambert
Wiliiuysen (the last a private student); at Groningen, by
Maiusen, Gouset, and Tobias Andrea; at Franeker, by
Raardus Andala; at Breda, Nimegen, Hardewyck,
Duisburg, and Herborn, and at the Catholic university
of Louvain, Cartesianism was warmly expounded and
defended in seats of learning, of which many are now left
desolate, and by adherents whose labors and their
accolades have for the most part long lost interest for any but the antiquary.
The Cartesianism of Holland was a child of the uni-
versities, and its literature is mainly composed of com-
mentaries upon the original texts, of theses discussed in
the schools, and of systematic expositions of Cartesian
philosophy for the benefit of the student. Three names
stand out in this Cartesian professoriate,—Wittich,
Clauberg, and Geulincx. Wittich (1625—1658), professor
at Duisburg and Leyden, is a representative of the moderate
followers, who professed to reconcile the doctrines of their
school with the faith of Christendom, and to refute the
philosophy for the benefit of the student. Three
similar

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(Éuvres, ex. 176.)
especially he had written to Pierre Meland, one of the order, to show how the Catholic doctrine of the eucharist might be made compatible with his theories of matter. But his undue haste to arrange matters with the church had only served to impress him more deeply. Unwise admirers and malicious opponents exaggerated the theological bearings of his system in this detail, and the efforts of the Jesuits succeeded in getting the works of Descartes, in November 1663, placed upon the Index of prohibited books.—

Thereupon the power of church and state enforced by positive enactments the passive resistance of old institutions to the novel theories. In 1667, the action at the interment was forbidden by royal order. In 1669, when the chair of philosophy at the College Royal fell vacant, one of the four selected candidates had to sustain a thesis against "the pretended new philosophy of Descartes." In 1671 the archbishop of Paris, by the king's order, summoned the heads of the university to his presence, and enjoined them to take stricter measures against philosophical novelties dangerous to the faith. In 1674 a decree of the Parliament against Cartesian and other unlicensed theories was on the point of being issued, and was only checked in time by the appearance of a burlesque pamphlet against the intruder Reason, composed by Boileau and some of his brother-poets. Yet in 1675 the university of Angers was empowered to repress all Cartesian teaching within its domain, and actually appointed a commission charged to look for such heresies in the theses and students' notebooks of the college. In 1677 the university of Caen adopted more stringent measures against Cartesianism. And so great was the influence of the Jesuits, that the congregation of St. Maur, the canon of Ste Geneviève, and the Oratory laid their official ban on the obnoxious doctrines. From the real or fancied approbations between Cartesianism and Jansenism, it became for a while unpalatable, if not dangerous, to avow too loudly a preference for Cartesian theories. Regis was constrained to hold back for ten years his System of Philosophy, and when it did appear, in 1690, the name of Descartes was absent from the title-page. There were other obstacles besides the mild persecutions of the church. Pascal and other members of Port Royal openly expressed their doubts about the place allowed to God in the system, the adherents of Gassendi met it by resuscitating atoms, and the Aristo-telians maintained their substantial forms as old, the Jesuits argued against the arguments for the being of God, and against the theory of innate ideas whilst Huet, bishop of Avranches, once a Cartesian himself, made a vigorous onslaught on the contempt in which his former comrades held literature and history, and enlarged on the vanity of all human aspirations after rational truth.

The greatest and most original of the French Cartesian was Malebranche. His Recherche de la Vertu, in 1674, was the baptism of the system into a theistic religion which borrowed its imagery from Auguste; it brought into prominence the metaphysical base which De la Forge, Rohault, and Regis had neither cared for nor understood. But this doctrine was a criticism and a divergence, no less than a consequence, from the principles in Descartes, and it brought upon Malebranche the opposition, not merely of the Cartesian physiocrats, but also of Arnauld, Fenelon, and Malebranche, as the proper authority. Popular enthusiasm, however, was with Malebranche, as twenty years before it had been with Descartes; he was the fashion of the day; and his disciples rapidly increased both in France and abroad.

In 1705 Cartesianism was still subject to prohibitions from the authorities, but in a project of new statutes,
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drawn up for the faculty of arts at Paris in 1729, the Method and Meditations of Descartes were placed beside the Organon and the Metaphysics of Aristotle as text-books for philosophical study. And before 1725, readings, both public and private, were given from Cartesian texts in some of the Parisian colleges. But when this happened, Cartesianism was no longer either interesting or dangerous; its theories, taught as unquestioned and verified truths, were as worthless as the systematic verbiage which preceded them. Already antiquated, it could not resist the wit and raillery with which Voltaire, in his Lettres sur les Anglais (1728), brought against it the principles and results of Locke and Newton. The old Cartesians, Maran and especially Fontenelle, with his Théorie des Tourbillons (1753), struggled in vain to refute Newton by styling attraction an occult quality. Fortunately, the Cartesian method had already done its service, even where the theories were rejected. The Port Royalists, Nicole and Arnauld, had applied it to grammar and logic, Domat and Duquesne to jurisprudence; Fontenelle, Perron, and Terrasson to literary criticism, and a worshipper estimate of modern literature. Though it never ceased to influence individual thinkers, it had handed on to Condillac its popularity with the masses. A Latin abridgment of philosophy, dated 1764, tells us that the innate ideas of Descartes are founded on no arguments, and are now universally abandoned. The ghost of innate ideas seems to be all that it had left.

In Germany a few Cartesian lecturers left their names at Leipsic and Halle, but the system took no root, any more than in Switzerland, where it had left. Over in the French court of France, and, after he proceeded to the court of France, and, after

*DESCHAMPS, EUSTACHE, called Moreau, a distinguished theatrical poet of France, was born at Vertus, in Champagne, early in the 14th century. The date of his birth has been approximately given as 1298, 1340, and 1345, according to the interpretation put upon certain vague state ments of his own. It is certain that he lived under four kings—Philip VI, John, Charles V, and Charles VI. He studied the seven liberal arts at the university of Orleans, and at the court of France, after first entering the service of a prince whose name he has not recorded, for more than thirty years took an active and prominent part in the joyous society of the day. Charged with a succession of honourable offices, he served not only the princes his contemporaries. His life was a long and romantic series of tournaments, feasts, and battles, and he was one of the most popular persons of his time. But before settling down to this life, he had a stormy youth of vicissitude. He was an eye-witness of the English invasion in 1358; he was in the siege of Rheims, and witnessed the march on Chartres; he was present also at the signing of the treaty at Bretigny. In 1360, as Châtelain of Vertus, he became the vassal of the young princess Isabella, to whom he paid great poetic homage. But he was then already a travelled man; he had visited Italy, Germany, and Hungary. Later on he took a part in the Flemish wars, and it was on this occasion that, about 1385, he received the surname, or nickname, of Moreau, which he sometimes himself adopted in later life. He is believed, but not on very strong evidence, to have travelled in Syria and Egypt, and to have been captured and imprisoned by the Saracens. In France he lived the true life of a troubadour, wandering from castle to castle with his poems. He had a violent hatred for the English nation, fostered no doubt by the experiences of his youth; and this he has expressed very abundantly in his writings, particularly in the famous prophecy that England would be destroyed so thoroughly that no one should be able to point to her ruins. He was *hauteur d'armes* to King Charles V., and by him appointed bailiff of Sensis and governor of Flanders. It was with great reluctance that, when he felt himself growing old, he retired from public life and went into a modest seclusion, where he occupied himself in the composition of a splendid satire against women, entitled Le Miroir de Mariage; though 12,000 lines of this exist, he left it unfinished and his name, which took place about 1420. Eustache Deschamps was an accomplished courtier, but he was extremely ugly; he disarms criticism by calling himself "La Roi de Laideur." His poems remained unprinted until our day, the great number of them being the manuscript in the Royal Library at Paris, containing 1129 ballads, 171 romances, 80 virellys, 14 lays, 28 farces, and various epistles and satires. This bulk of MSS. was edited and published in 4to by M. G. A. The chief collections of the works of Descartes are the two Latin texts in 9 vols. 4to by Elzevir 1715, and in 7 vols. 4to, Frankfurt, 1697, and the French edition by Cousin in 11 vols. 8vo, Paris, 1824-26. The chief historical works are The Direction of the Mind, The Search for Truth by the Sight of Nature, and other unimportant fragments, published, in Latin, in 1701 by 1850-51, and the posthumous works, The Bulletin de la Société des Sciences, Paris, containing 1175 ballads, 171 romances, 80 virellys, 14 lays, 28 farces, and various epistles and satires. This bulk of MSS. was edited and published in 4to by M. G. A. The chief collections of the works of Descartes are the two Latin texts in 9 vols. 4to by Elzevir 1715, and in 7 vols. 4to, Frankfurt, 1697, and the French edition by Cousin in 11 vols. 8vo, Paris, 1824-26. The chief historical works are The Direction of the Mind, The Search for Truth by the Sight of Nature, and other unimportant fragments, published, in Latin, in 1701 by 1850-51, and the posthumous works, The Bulletin de la Société des Sciences, Paris, containing 1175 ballads, 171 romances, 80 virellys, 14 lays, 28 farces, and various epistles and satires. This bulk of MSS. was edited and published in 4to by M. G. A.
Crapelet in 1832, preceded by a literary and historical monograph. The value of his writings being recognized, another and more critical edition was brought out, in 1849, by M. Ponsard Tarbé. The same editor published Le Miroir de Mariage in 1855, and a long poem entitled Le Lay des dous Estats doul, in 1870. Deschamps excelled in the use of the ballad and chanson royal. In each of these forms of verse he was the greatest master of his time. One of his ballads is addressed to the English poet "Geoffroy Chaucier," to whom he says—

Tu es d'amours montadins dut en Albus
Et de la Rose en la terre Anglaise.

In Eustache Deschamps the modern language of France first found a pure lyrical expression; his long life seems to connect the literature of Tausbald IV. with that of Charles of Orleans.

DESSERT. See Physical Geography.

DESFONTAINES, RENÉ LOUISÉ (1751-1833), French botanist, was a native of Brittany, born at Trouville, in the department of Calvados, in 1751 or 1752. He was sent to the town school, but made slow progress in learning, and was at length dismissed by the schoolmaster as a dullard and a robber of apple orchards. This treatment left a life-long painful impression on his mind. At the college of Rennes, to which he was next sent, he applied himself heartily to study, and reduced in a success which falsified the judgment of his old master. From Rennes he passed to Paris, to study medicine, but this soon became a secondary pursuit, his chief attention being drawn to the study of plants. At Paris he acquired the friendship of Lemonnier, physician to the king, and of Jussieu. At the age of thirty he took his degree of M.D., and in 1783 he was elected member of the Academy of Sciences. In the same year he set out for North Africa, and spent two years in a scientific exploration of Barbary. In 1789 he returned to Paris, bringing with him a large collection of plants, animals, and other objects illustrative of natural history. The collection, it is stated, comprised 1600 species of plants, of which about 300 were described for the first time. His successful labours were rewarded, and a new congenial field of work was opened to him, and of his retirement, to the post of professor at the Jardin des Plantes, vacated in his favour by his friend Lemonnier. The garden, says one of his biographers, now became his world. His life was therefore marked by few incidents. He devoted himself to his pupils, to his plants, and to the preparation of various botanical works. He purposed to publish a narrative of his African explorations, but the manuscript journal being lent to Lemonnier, and by him to the king, Louis XVI., was lost, and only a few fragments of the narrative appeared. His great work is entitled Flora Atlantica seu historia plantarum quae in Atlantico, agro Tuscania et Algeriensem crescent. It was published in 2 vols. 4to in 1798, and is esteemed for the singular clearness and precision of its descriptions and its nomenclature. Desfontaines, as a redoubt student, escaped the perils of the Reign of Terror. On the day he formally quitted his retirement to receive the naturalists Ramond and Lheritte from prison and from death. He was admitted to the Legion of Honour at the time of its establishment. At the age of sixty-three he married a young wife, but the prospect of happiness thus opened was soon closed by her death. In 1831 he became blind, and was reduced to the recognition of his favourite plants by touch alone. Desfontaines was author of many valuable memoirs on vegetable anatomy and physiology, descriptions of new genera and species, &c., contributed to learned societies and scientific journals. One of the most important was the "Memoir on the Organization of the Monocotyledons," which gave him a high place among discoverers. He published in 1804 a Tableau de l'école botanique du musée d'histoire naturelle de Paris, of which a third edition appeared in 1831, under the new title Catalogus Plantarum Horti Regii Parisiensis. His modesty, simplicity and good humour endeared him to his friends and to his pupils. He died at Paris on the 16th November 1833, a daughter surviving him. His Barbary collection was bequeathed to the museum, and his general collection passed into the hands of the botanist Webb.

DESHOU lières, ANTOINNE DU LIGON de LA GARD (1634-1694), a French poetess, born at Paris, was the daughter of the Chevalier de la Garde, maître d'hôtel to the queens Mary de Medici and Anne of Austria. She received a careful and very complete education, acquiring while still young a knowledge of Latin, Spanish, and Italian, and studying prose under the direction of the poet Hesnaut. At the age of eighteen she married the Sieur de Dufraine, who had soon afterwards to go abroad along with the prince of Condé on account of his intrigue with the princess. Madame Deshoulières returned in 1817 to the house of her parents, where she gave herself to writing poetry and studying the philosophy of Gassendi. She rejoined her husband at Roermon, near Brussels, where, being distinguished for her personal beauty, she became the object of embarrassing attentions on the part of the prince of Condé, against which, however, she knew how to protect herself. Having made herself obnoxious to the Government by her urgent demand for the annuities of her husband's pay, she was imprisoned in the chateau of Wilwurd, the hardships being increased by the refusal of all books except the Bible and some volumes of the fathers. After a few months she was freed by her husband, who attacked the chateau at the head of a small band of soldiers. An amnesty having been proclaimed, they returned to France, where Madame Deshoulières soon became a conspicuous personage at the court of Louis XIV. and in literary society. She won the friendship and admiration of the most eminent literary men of the age—some of her more zealous flatterers even going so far as to style her the tenth muse, and the French Calliope. Her poems were very numerous, and included specimens of nearly all the minor forms, odes, elegies, idylls, elegies, chansons, ballads, madrigals, &c. Of these the idylls alone, and only some of them, have stood the test of time, the others being entirely forgotten. She wrote some dramatic works, the best of which were the Échos de l'amour. Her life was nearly at the end of her thirtieth year, and she died at Paris on the 17th February 1694. Complete edition of her works were published at Paris in 1797 and 1799. These include a few poems by her daughter Antoinette Thérèse Deshoulières (1662-1718), who inherited her talent.

DESIDERIO DA SETTIGNANO, sculptor, was born near Fiesole in the province of Florence, in 1295. Vasari's statement, that he died at the age of twenty-eight, is altogether a mistake. Settignano is a village on the southern slope of the hill of Fiesole, still surrounded by the quarries of sandstone of which the hill is formed; and still inhabited, as it was 400 years ago, by a race of "stone-cutters," several of whom, though not disdaining the title of "lapicida," earned for themselves honoured places in the roll of Florentine Virtuosi. VII. — 17
sculptor. Desiderio was for a short time a pupil of Donatello, and he seems to have worked also with Mino da Fiesole, with the delicate and refined style of whose works those of Desiderio seem to have a closer affinity than with the perhaps more masculine tone of Donatello. Vasari especially praises the works of Desiderio for their grace and simplicity which, as the critic remarks, are a gift of nature, and can be acquired by no study. He particularly extols the sculptor's treatment of the figures of women and children, and the elegance applies equally to the genius and manner of Mino da Fiesole. It does not appear that Desiderio ever worked elsewhere than at Florence; and it is there that those who are interested in the Italian sculpture of the Renaissance must seek the few but remarkable works of his chisel, which have survived the changes and chances of four centuries.

DESMOINES, formerly Fort Des Moines, a city of the United States, capital of Iowa, at the confluence of the Raccoon with the Des Moines River, which is one of the main right tributaries of the Mississippi, and is navigable thus far for steamboats. Its public buildings include the old capitol, erected in 1856, the new capitol, founded in 1870, the post-office, with a number of other United States offices under the same roof; the Baptist college, 15 churches, and 8 high schools; and among its industrial establishments are a paper-mill, a woolen factory, an oil-mill, besides foundries, machine-shops, flour-mills, and plough-factories. There are two public libraries in the town, one of which is maintained by the State, and numbers 15,600 volumes, and, besides several daily and weekly newspapers, no fewer than six monthly periodicals are published. Forty acres of ground have been appropriated for a public park; and another area of 100 acres belongs to a park-company. Coal, lime, and clay are abundant in the neighbourhood, and the town is supplied with water from the Raccoon. Des Moines, which dates from 1846, received incorporation in 1851, and was raised to the rank of a city and the capital of the State in 1857. Population in 1860, 3965; in 1873, 15,601.

DESMOULINS, LUCIEN SIMPLICI CAMILLE BENOIST (1760-1794), was born at Guise, in Picardy, on the 2d of March 1760. His father was lieutenant-general of the bailiwick of Guise, and was desirous that Camille his eldest son, who from his earliest years gave signs of unusual intelligence, should obtain as complete an education as France could then bestow. His wishes were accorded by a friend obtaining a "bourse" for the young Desmoulins, who at the age of fourteen left home for Paris, and entered the college of Louis le Grand. In this school, in which Robespierre was also a burse and a distinguished student, Camille laid the solid foundation of his learning and made an acquaintance with the literature and history of the classical nations so deep and extensive that it furnished him throughout the whole of his short and chequered life with illustrations which he applied with brilliancy and effect to the social manners and political events of his time.

Desmoulins having been destined by his father for the law, and having completed his legal studies, was admitted an advocate of the Parliament of Paris in 1785. His professional success was not great; his manner was violent, his appearance far from attractive, and his speech was impaired by the natural defect of a painful stammer. He indulged and fostered, however, his love for literature, he was closely observant of the course of public affairs, and he was thus gradually being prepared for the main duties of his life—those of a political littérateur.

In March 1789 Desmoulins began his political career. Having been nominated deputy from the bailiwick of Guise, he appeared at Laon as one of the commissioners for the election of deputies to the States General summoned by royal edict of 24th January. Camille heralded its meeting by his Ode to the States General. It is, moreover, highly probable that he was the author of a radical pamphlet entitled La Philosophie au peuple Français. His hopes of professional success were now scattered, and he was living in Paris in extreme poverty and almost in squalor. He, however, shared to the extent of which he was enabled to attend the meeting of the States General. As appears from his letters to his father, he watched with exultation the procession of deputies at Versailles, and with violent indignation the events of the latter part of June which followed the closing of the Salle des Menus to the deputies who had named themselves the National Assembly. It is further evident that Desmoulins was already sympathizing, not only with the enthusiasm, but also with the fury and cruelty, of the Parisian crowds.

The sudden dismissal of Necker by Louis was the event which brought Desmoulins to fame. On the 12th of July 1789 Camille, leaping upon a table in one of the cafés of the Palais Royal, started to a numerous crowd of listeners by the announcement of the dismissal of their favourite. Losing in his violent excitement the stammer which impeded his ordinary speech, he inflamed the passions of the mob by his burning words and his call "To arms!" This dismissal," he said, "is the tomb of the St Bartholomew of the patriots." Drawing, at last, two pistols from under his coat, he declared that he would not fall alive into the hands of the police who were watching his movements. He descended amid the embraces of the crowd, and his cry "To arms!" resonated on all sides. This scene was the beginning of the actual events of the Revolution. Following Desmoulins the crowd surged through Paris, procuring arms by force; and on the 13th it was partly organized as the Parisian militia which was afterwards to be the National Guard. On the 14th the Bastille was taken.

Desmoulins may be said to have begun on the following day that public literary career which lasted till his death. In May and June 1789 he had written La France libre, which, to his chagrin, his publisher refused to print. The taking of the Bastille, however, and the events by which it was preceded, were a sign that the times had changed, and on the 15th of July Desmoulins's work was issued. It attracted immediate attention. By its erudite, brilliant, and love of popularity inflamed, he pandered to the passions of the lower orders by the publication of his Discours de la lanterne aux Parisiens, which with an almost foibles reference to the excesses of the mob he headed by a quotation from St John, Qui male agit odoet lu-um. Camille was dubbed "Procureur-général de la lanterne."

In November 1789 Desmoulins began his career as a journalist by the issue of his weekly publication—Révolutions de France et de Brabant. He conducted this alone till July 1790, and thereafter with the assistance of Stanislaus Freron till July 1792, when the publication ceased. Success attended the Révolutions from its first to its last number, Camille was everywhere famous, and his poverty was relieved. These numbers are valuable as an exhibition not so much of events as of the feelings of the Parisian people during the most stormy period of their history; they are adorned, moreover, by the erudition, the wit, and the genius of the author, but they are disfigured, not only by the most bitting personalities and the defence and even advocacy of the excesses of the mob, but by the entire absence of the forgiveness and
Desmoulins had now become an acknowledged leader of public opinion. Its sudden changes suited his fickle temperament, and form the only excuse for the glaring inconsistencies which disfigure his published writings. Mirabeau, for instance, whose genius and hospitality he had frequented and openly lauded, he afterwards thought fit to denounce as the god of orators, haras, and thieves. He was powerfully swayed by the influence of more vigorous minds, and for some time before the death of Mirabeau, in April 1791, he had begun to be led by Danton, with whom he remained associated during the rest of his life. In July 1791 Camille appeared before the municipality of Paris as head of a deputation of petitioners for the deposition of the king. In that month, however, such a request was dangerous, there was excitement in the city over the presentation of the petition, and the private attacks to which Desmoulins had often been subject were now followed by a warrant for the arrest of himself and Danton. Danton left Paris for a little. Desmoulins, however, remained there, appearing occasionally at the Jacobins club. He resigned his functions as a journalist, and the issue of his Revolutions ceased.

Three months afterwards, however, he again appeared in public, having been appointed secretary to the Society of the Friends of the Constitution. His second attempt at journalism was made in April and May 1792, in the issue of several numbers of the Tribune des Patriotes, but success did not attend the effort, and it was in his pamphlet Jean Pierre Brissot dénoncé, which abounded in the most violent personalities, that Desmoulins again secured the eager attention of the public. This pamphlet, which had its origin in a petty squabble, was followed in 1793 by a Fragment de l'histoire secrète de la Révolution, in which the party of the Girondins, and specially Brissot, were most mercilessly attacked.

On the nomination of Danton, after the excesses of the 10th of August 1792, to the post of minister of justice, Desmoulins was appointed his secretary general. On September the 8th he was elected one of the deputies for Paris to the lately created National Convention. He was not successful as an orator. He was of the party of "the Mountain," and voted for the abolition of royalty and the death of the king. With Robespierre he was now more than ever associated, and the Histoire des Brissotins, the fragment above alluded to, was inspired by the arch-rival. The success of the brochures, so terrible as to send the leaders of the Girondins to the guillotine, alarmed Danton and the author. Not so with Robespierre, and the split was formed which was to end in the ruin of the Dantonists.

In December 1793 was issued the first number of the Venis Cordelier, by which Danton's idea of a committee of clemency was formulated and upheld. From the first Robespierre, although revising the sheets, disapproved of it, and at the fifth number the actual rupture became visible. Robespierre took advantage of the popular indignation roused against the Roberianists to send them to death, but the time had come when Saint Just and he were to turn their attention not only to les enragés, but to les indulgents—the powerful faction of the Dantonists. On the 7th of January 1794 Robespierre, who on a former occasion had defeated Camille when in danger at the hands of the National Assembly, in addressing the Jacobins club counselled not the expulsion of Desmoulins, but the burning of certain numbers of the Venis Cordelier. Camille sharply replied that he would answer with Rousseau,—"burning is not answering," and a bitter quarrel thereupon ensued. By the end of March not only were Hébert and the leaders of the extreme party guillotined, but their opponents, Danton, Desmoulins, and the best of the moderates were arrested. On the 31st the warrant of arrest was signed and executed, and on the 3d, 4th, and 5th of April the trial took place before the Revolutionary Tribunal. It was a scene of terror not only to the accused but to judges and to jury. The retorts of the prisoners were notable. Camille on being asked his age, replied, "I am thirty-three, the age of the sancto-pater, Jesus, a critical age for every patriot." This was false, he was thirty-four. Turville, alarmed at the eloquence of Danton, procured from the Committee of Public Safety a decree which closed the mouths of the accused. Armed with this and the false report of a spy who charged the wife of Desmoulins with conspiring for the escape of her husband and the rum of the republic, Turville by threats and beseechings at last obtained from the jury a sentence of death. It was passed in absence of the accused, and their execution was appointed for the same day.

Since his arrest the courage of Camille had miserably failed. He had exhibited in the numbers of the Venis Cordelier almost a disregard of the death which he must have known hovered over him. He had with consummate ability exposed the terrors of the Revolution, and had adorned his pages with illustrations from Tacitus, the force of which the commonest reader could feel. In his last number, however, which his publisher refused to print, he had dared to attack even Robespierre, but at his trial it was found that he was devoid of physical courage. He had to be torn from his seat ere he was removed to prison, and as he sat next to Danton in the tumble which conveyed them to the guillotine, the calmness of the great leader failed to impress him. In his violence, bound as he was, to tore his clothes into shreds, and his bare shoulders and breast were exposed to the gaze of the surging crowd. Of the fifteen guillotined together, including among them Herault de Séchelles, Westermann, and Philippeaux, Desmoulins died third, Danton, the greatest, died last. With them also died the hope of the Revolution. But a few months were to pass ere it was to be solemnly declared that they had "deserved well of humanity." On the 26th of December 1793, Camille had married Lucile Duplessis, and among the witnesses of the ceremony are observed the names of Brissot, Pétion, and Robespierre. The only child of the marriage, Horace-Camille, was born on the 6th of July 1792. Two days afterwards Desmoulins brought it into notice by appearing with it before the municipality of Paris to demand "the formal statement of the civil estate of his son." The boy was afterwards pensioned by the French Government. Lucile, Desmoulins's accomplished and affectionate wife was, a few days after her husband, and on a false charge, condemned to the guillotine. "She astonished all beholders by her calmness with which she braved death.'

See the biography of Desmoulins by Edward Henry and Jules Claricte. The latter entitled Camille Desmoulins and his Wife, has been translated into English (London, 1873). The work of Emile Mercier, Histoire des hommes de peac, is not trustworthy. See also the literature of the Revolution, and especially of the Jacobins. The standard edition of Desmoulins's works is of Paris, 1833. [This note 1]

De Soto, Ferrando (1406-1542), a Spanish captain and explorer, who is frequently accredited with the honour of being the discoverer of the Mississippi, is certainly one of the most remarkable of the Liberian adventurers of the 16th century. He was born at Xeres de Caballeros, in Extremadura, of an impoverished family.

1 This is borne out by the register of his birth and baptism, and by words in his last letter to his wife, "I die at thirty-four." The dates (1626-94) given in nearly every biography of Desmoulins are certainly incorrect.
of good position, and was indebted to the favour of Pedranas Davila for the means of pursuing his studies at the university. He commenced active life in 1519 by joining his patron in his second expedition to Darren, where he distinguished himself by his ability and the independence of his demeanour. In 1528 we find him exploring the coast of Guatemala and Yucatan, and in 1532 he had a reinforcement of 300 volunteers to the assistance of Pizarro in Peru. To him was due the discovery of the pass through the mountains to Cuzco; and in the capture of that city and in other important engagements he bore a brilliant part. After the completion of the conquest De Soto, who had landed in America with "nothing else of his own save his sword and target," returned to Spain with a fortune of "an hundred and fourscore thousand ducatins," which enabled him to marry the daughter of his old patron Davila, and to maintain "all the state that the house of a nobleman required." The Emperor Charles V., to whom he had lent a portion of his wealth, appointed him governor of the Island of Gaspar, and adelantado or president of Florida, which was then the object of great interest, as possibly another Peru. In 1538 he set sail with an enthusiastic and richly furnished company of about 600 men, of whom several had sold all that they possessed to furnish their equipment. Landing in May 1539 at Espiritu Santo Bay, on the west coast of the present State of Florida, the explorers continued for nearly four years to wander from one point to another, ever deceived in their expectations, and ever allied by the report of the wealth that lay beyond. The exact line of their route is in many places difficult to identify, but it seems to have passed N. through Florida and Georgia as far as 36° N. lat., then S. to the neighbourhood of Mobile, and finally N.W. towards the Mississippi. This river was reached early in 1541, and the following winter was spent on the Wachita. As they were returning in 1542 along the Mississippi, De Soto died (either in May or June), and his body was sunk in its waters. On the failure of an attempt which they made to push eastwards again, his men, under the leadership of Moscoso, were compelled in 1543 to trust themselves to the stream. A voyage of nineteen days brought them to the sea, and they then held along the coast to Panuco, in Mexico.

Of this unfortunate expedition three narratives are extant, of somewhat different origin, and of very different character. The first was published in 1557 at Seville, and professes to be the work of a Portuguese gentleman of Elvas, who had accompanied the expedition. It was called "El adelanto verdadero de las batallas y he Gobernador de Pernambuco de & otros Fulos portugueses pasados por el redentor rama de la Provincia de Florida." A later version was published by A. V. da Guerra in 1609, and another by an anonymous translator in 1856, the latter being based on a French version which had appeared at Paris in 1635 from the pen of Cirici de la Guette. The second narrative is the famous history of Florida by the Inca, Garcilasso de la Vega, who obtained his information from a Spanish cavalier engaged in the enterprise; it was completed in 1591, first appeared at Lisbon in 1605 under the title of "La Florida del Vino, y has passed since published in many editions in the works of his Majesty's factors. It is to be found in "The Historical Collections of Louisiana," Philadelphia, 1855, and in W. B. Ray's reprint for the Hakluyt Society of Hakluyt's translation of the Portuguese narrative.

See Bancroft's "History of the United States," vol. 1; McCulloch, "Researches Concerning the Aboriginal History of America," Monette, "History of the Discovery and Settlement of the Valley of the Mississippi."
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is distant about 460 miles. Its public buildings include a

the Campus Martius, a public "place" about 600 feet long

and 250 feet wide. The chief public building is the city

hall, which faces the Campus Martius from fronts on four

streets, and is one of the finest structures of the kind in

the West. Built of sandstone, and designed after the

Italian style of architecture, it measures 200 feet long, and

90 feet wide, and is surmounted by a tower 180 feet high.

The cost of the building amounted to $600,000 (£120,000)

Other noteworthy structures are the opera house, the

office of the Board of Trade, the Roman Catholic

cathedral, which is the most imposing of the many

churches in the city, the custom house, containing also

the post-office, and the Michigan Central Railroad freight depot,

which is 1250 feet long by 102 feet wide. On the Campus

Martius stands the Michigan Soldiers' and Sailors' Monument.

It is of bronze and granite, 55 feet high and about

20 feet in diameter at the base. It is surmounted by a

colossal bronze statue of an Indian girl representing

Michigan in defence of the Union. The design comprises

numerous other bronze figures, all of which were cast in

Munich.

The commercial facilities of Detroit are very extensive.

The Detroit River is a connecting link in the great chain

of lake navigation, and affords the best harbour on the

lakes. The city is the centre of an extensive railroad

system, which presents important channels of transportation

in almost every direction. Not fewer than five trunk lines

diverge to the eastern seaboard. More than 350 vessels

are owned here, and from ten to thirteen daily lines of

steamers run to various points on the lakes. There is a

considerable foreign commerce with Canada, the imports

in 1875 amounting to $1,680,932, and the exports to

$2,340,015; 4426 vessels entered and 4355 cleared in

the foreign trade, 3968 entered and 3000 cleared in the

coastwise trade. The large quantities of produce, chiefly

from Michigan, passing eastward through the city by rail

and water, give to Detroit an extensive domestic commerce.

The manufacturing industries of the city are extensive and

important. The working of iron is carried on in numerous

blast furnaces, foundries, and other establishments. In

1875, 9 mills manufactured 238,200 barrels of flour, 8

factories produced more than 4,000,000 lb of chewing

and smoking tobacco, and 171 establishments made about

30,000,000 cigars. Twelve saw-mills annually cut from

45,000,000 to 50,000,000 feet of lumber, and 26 brick-

yards make from 55,000,000 to 60,000,000 bricks a year.

The extensive Pullman car works, with a capital of about

$12,000,000, are situated here, also one of the seven pin

factories in the United States. The city glass works

produce about $200,000 worth of glass a year, and the

lumber smelting works more than $2,000,000 worth of

nogot copper from Lake Superior ore. There are four

ship-yards and three large dry docks.

Detroit has 10 lines of street railway, with more than 45

miles of track intersecting the city in every direction. It

is divided into 11 wards, each returning 2 aldermen to the

city council, and has a metropolitan police of 100

members; 7 steam fire-engines, the stations of which are

connected by telegraphic alarm apparatus with all parts of

the city; and ample supplies of water from the river.

There are 64 churches, 14 asylums and hospitals, 18

public schools, 4 public libraries, the largest in a city,

about 25,000 volumes, 2 medical colleges, and 3 medical

societies, 8 daily newspapers, and 30 weekly and

monthly papers and periodicals, several public parks;

10 banks, with an aggregate capital of $5,210,000, and

63 incorporated companies, representing capital stock to

the amount of $22,415,000. The net city debt proper,

January 1, 1875, amounted to $900,340, or about $9.78

per head of the population.
DEU—DEU

Detroit was settled by the French early in the 18th century, and passed into the hands of the English in 1763. It was then besieged for eleven months by the Indian chief, Pontiac. Ceded to the Americans in 1783, it was not occupied by them till 1796. It was incorporated as a city in 1824, and was the capital of Michigan from 1837 to 1847, when that honour was transferred to Lansing.

DEUCALION, in Greek legend, corresponds to the Biblical Noah. A great flood had destroyed the whole race of men except Deucalion and his wife Pyrrha, who saved themselves in a boat or ark, from which they landed on Mount Othrys, or, as it was afterwards said, on Mount Parnassus. They were then commanded by Zeus to cast behind them the bones of their mother, i.e., the stones of the hill side, and from the stones thrown by Deucalion sprung men, from those thrown by Pyrrha, women. Hence men were called Aoel, "stone race." Deucalion’s son Hellen was the founder of the race of Helians. The chief city of this legend was Troezen; but it existed also at Dodona, where Deucalion was thought to have introduced the worship of Zeus.

DEUTERONOMY. See PENTATEUCH.

DEUTSCH, Emanuel Oscar Morgen (1829–1873), an eminent Oriental scholar, was born on the 28th of October 1829, at Nelsse, to solemnize the marriage of Nelsse, to solemnize the marriage of his native place, October 1829, at Nelsse, Detroit was a factor, having 100 papers to Palatinate, in Germany Zerubabel, and in Latin Belphegor, a town of Bavaria, in the Palatinate, 50 miles west of Spire, on the Erbach, which ultimately finds its way to the Moselle. Besides a court of appeal for the Palatinate, a penitentiary, and various administrative offices, it possesses a public library, a gymnasium, and a synagogue. Its most important buildings are the old ducal palace, greatly damaged by the French in the 18th century.

DEUTZ (Latin, Tutium), an old town of Rhenish Prussia, on the right bank of the Rhine, opposite to Cologne, with which it is connected by two bridges. It contains the church of St. Bertold, built in the 17th century, a Protestant church, a cavalry barracks, artillery magazines, and gas, porcelain, machine, and carriage factories. The fortifications of the town form part of the defences of Cologne. The population in 1875 was 14,513. To the east of Deutz is the manufacturing suburb of Kalk, with about 8,500 inhabitants. The old castle in Deutz was in 1602 made a Benedictine monastery by Heribert, archbishop of Cologne. Permission in 1657 to the town to pay 12 sous per head per annum was granted to the citizens by the archbishop of Cologne, between whom and the counts of Berg it was in 1240 divided. It was burnt in 1376, 1445, and 1583; and in 1678, after the peace of Nimeguen, the fortifications were demolished. They were rebuilt in 1616. See C O L O M B E.

DEUX PONTS, in German Zerubabel, and in Latin Belphegor, a town of Bavaria, in the Palatinate, 50 miles west of Spire, on the Erbach, which ultimately finds its way to the Moselle. Besides a court of appeal for the Palatinate, a penitentiary, and various administrative offices, it possesses a public library, a gymnasium, and a synagogue. Its most important buildings are the old ducal palace, greatly damaged by the French in the 18th century.
and in 1868 transformed into a court-house, Alexander's Church, with the ducal burial-place, and the church which was built by Charles XI of Sweden. The industry of the inhabitants is mainly devoted to the manufacture of cotton, silk, tobacco, and oil. Population in 1875, 9,300.

Deux Ponts, which derives its name from the two bridges over the Erzé, was before 1394 the seat of an imperial countship. On the partion of the Palatinate, which with it was incorporated, it became in 1440 an independent duchy, which in 1524 formed a kung to Sweden in the person of Charles Gustavus. The death of Charles XII in 1718 broke its connection with the Swedish crown, and the extinction of the Arkelburg line, to which it was next transmitted, passed it on to the present ruling family of Bavaria. In literary history it is interesting as the place where the Bistropine editions of the Greek, Latin, and French classics were published by a learned society in the latter part of the 18th century. See J. C. Crillon, Origin des Bistropines, 1761-1766, Lehmans, Vollstandige Geschichc des Nachrichtums Einzelnueck, Munich, 1857.

DEVAFRAYA, a town of British India, in the presidency of Bengal and province of Gharwal, in 30° 9' N. lat. and 78° 39' E. long. It is one of the five sacred towns of the Hindos,—a pre-eminence which it owes to its position at the confluence of the Alakhananda and the Bhagirathi, whose united waters constitute the Ganges proper. It stands at an elevation of 2265 feet above the sea.

DEVELOPMENT. See EMBRYOLOGY AND EVOLUTION.

DEVENTER, or, by corruption, DEMTER, a town of Holland, in the province of Overoysel, about 25 miles north of Arnhem, on the right bank of the Yssel, which there receives the waters of the Schipbeek, and is crossed by a bridge of boats. It is a clean, prosperous place, and at the same time preserves a large number of ancient buildings as well as its fortifications. Of special interest are the Protestant church of St. Levin, which dates from 1334, occupies the site of an older structure of the 11th century, and possesses some fine stained glass, the Roman Catholic Broerkerk, with three ancient gospels, the Bergkerk, which belonged to the Premonstratensians, the town-hall, built in 1653, containing a remarkable painting by Terburg, who was for some time burgomaster of the town, and the weigh-house, which dates from 1553. There are also cavalry-barracks, an arsenal, a court-house, a hospital, and a lunatic asylum, while among the scientific and educational institutions, an observatory, a grammar school, and a high school may be mentioned. Deventer is, last known as the "Athensam," down to 1684, dates from 1830, and has a library of 6000 volumes, inclusive of a number of Oriental MSS., several encyclopaedias, and a 15th century copy of Repvard the Fox. The archives of the town are of considerable value from the fact that it was the capital of a county. Besides a good agricultural trade, the inhabitants carry on the weaving of carpets, woollens, and silks, cotton-printing, and iron-founding, and their honey-cakes are exported in large quantities to all parts of the Netherlands. Population in 1869, 17,952.

Deventer is mentioned in 778 in connection with a Saxon church, but its importance only dates from the 11th century. In 1128 it was relieved by the emperor Henry V from an investment by the dukes of Saxony and the bishop of Munster to Queen Eleanor of England it was relieved for the monastery of the Beclettes, and in 1355 she breathed her last within its walls. During the War of Independence it was treacherously surrendered to the Spaniards by Edward Stanley, an Englishman, but was recaptured in 1591 by Prince Maurice of Orange as bishop, which had been established only in 1559, was the absorbed, and in the following year it was found necessary to destroy its wooden bridge over the Yssel. In 1813 it was invested by the Allies, and in 1814 the French withdrew in terms of peace.

DEVEREUX. See ESSEX, EARLS OF.

DE VIGNY, ALFRED VICTOR, COUNT (1797-1863), a distinguished French poet and novelist, was born at Luchon, in Touraine, March 27, 1797 (or 1799). His father, a man of noble descent, was a cavalry officer, who had served with distinction in the Seven Years' War. His mother was the daughter of an admiral. Tales of military achievements and traditions of the ancien régime were familiar to him in his childhood, and furnished the most powerful influences towards the formation of his character and the direction of his early ambition for education at Paris, at the school of M. Hix, but, his royalist sympathies being threatened by the prevailing admiration for the empire, he was removed and placed under a private tutor. After the first restoration of the Bourbons he was admitted, at the age of sixteen, into the musqueteers of the royal household, and in this capacity he accompanied the royal family to Ghent in 1815. In the following year, on the suppression of the musqueteers, he passed into the royal guard. He remained in the army about thirteen years, and attained the rank of captain, but without seeing active service, and, wearied with the dulness of the life which he had desired, resigned his commission in 1827. He had not long before married a rich English lady. The leisure of his soldier-life had not been wasted. Not only was his knowledge by observation of men and experience of life, but he meditated much, and, as he says, had all his works in his head,—"la marche avec moi ... et quand on marche, j'écris." His first publication was a volume of poems, which appeared in 1822. Some of these had already been published in periodicals, and he was therefore starting on his poetical career about the same time that Victor Hugo was writing his earliest Odes and Lamartine's earliest Méditations. Two years later (1824) he published the poem of Elfe, a poem of a lost life, an elaborate embodiment of a delusive fancy. It is the story of a bright creature, "mignonne de l'ange," born in a tear of the Saviour, and whose tender pity for the evil spirit becomes the occasion of her own fall. This was followed by several other poems, Le Dilettu, Muse, Dolorida, &c. In these later pieces De Vigny shows himself to have been under the powerful influence of Victor Hugo. In 1829, however, notwithstanding the evidence of genuine inspiration as a poet, he had not attained general recognition. This he first secured, won it even by storm, by the publication, in 1826, of his historical romance, Cinqui Mars, the story of a conspiracy under Louis XIII. This work appeared one year before Manon's famous novel, La Dame de Scudéry, and both works were among the most noteworthy productions of the school of Walter Scott, whose Continental reputation was then at its height. The book had an immense run, and passed through many editions. In its pages the author shows himself qualified to present in a masterly and truthful way the character of an age, to draw vigorous portraits of great historical figures, and to depict feeling with delicacy and simplicity. It was about this time that De Vigny's friendship with Lamartine began. He was now one of the recognized chiefs of the new school, the Romantics, and one of the editors of the Musée françois. In 1829 he produced a translation of Othello, which was acted at the théâtre Français, but was not very warmly received. His next dramatic attempt was La Matelotte d'Amour, performed at the Théâtre in 1831. This work appeared one year before Manon's famous novel, La Dame de Scudéry, and both works were among the most noteworthy productions of the school of Walter Scott, whose Continental reputation was then at its height. The book had an immense run, and passed through many editions. In its pages the author shows himself qualified to present in a masterly and truthful way the character of an age, to draw vigorous portraits of great historical figures, and to depict feeling with delicacy and simplicity. It was about this time that De Vigny's friendship with Lamartine began. He was now one of the recognized chiefs of the new school, the Romantics, and one of the editors of the Musée françois. In 1832 he produced a translation of Othello, which was acted at the théâtre Français, but was not very warmly received. His next dramatic attempt was La Matelotte d'Amour, performed at the Théâtre in 1831. Although faulty in construction, and better fitted the closet than for the stage, this powerful play has kept its place in the theatrical repertory. De Vigny's remarkable prose work, entitled Stello, ou les Deux Douleurs, appeared in 1832. It consists of three biographical studies, the subjects of which are three unfortunate poets, Gilbert, Chatterton, and André Chénier, who, in their ambition to Stella, an invalid poet, by a philosophical physician, le
docteur nean. True in spirit while inaccurate in detail, these stories, exquisitely told, are intended to teach poets the lesson of self-rentunciation. Stello was followed, in 1835, by another prose work of equal, perhaps superior, literary merit, entitled *Seritude et grandeur militaire*. This too, like Stello, is composed of three stories; and in these is depicted the soldier's life, his sufferings, his death, and his true reward. "The poem of human life," says J. S. Mill, in his review of De Vigny's works (Discoursations, vol. 1), "is opened before us, and M. de Vigny does but chant from it, in a voice of subdued sadness, a few strains telling of obscure wisdom and unwielded virtue,—of those ancient characters which, without self-glorification or hope of being appreciated, carry on, as he expresses it, 'the sentiment of duty to its extremest consequences.'"

De Vigny's latest gift to the world was his *Poèmes philosophiques*, or *Les Destinées*, part of which appeared in his life-time in the *Revue des Deux Mondes*, the rest, with these, were published after his death by his literary executor. These mainly utterance of unbelief and despondency, intermixed with exhortations to a stoical resignation and self-reliance. De Vigny was received at the French Academy in January 1846, but, in consequence of the coldness of the reception and the offensive speech of M. Molé on the occasion, he refused to be presented to the king. He died at Paris, after severe and prolonged sufferings bravely borne, September 17, 1863. (W.L. N.C.)

DEVL is the name which has been given in the New Testament and in Christian theology to a supreme evil personality supposed to rule over a kingdom of evil spirits, of whom he is the chief, and to be the restless and unfailing adversary of God and man. The Hebrew term shaphaq, used interchangeably, and same as Satan, was the latest gift to the world was his *Les lIestinees*, one of the chief, and to be the restless and destiny of human the New Testament; and, although the *Son of God* to present himself before the Lord. He is the image of justice, restlessness, and envy—the willing messenger of evil to Job; but he is not represented as the impersonation of evil, or as a spiritual assailant of the patriarch. He is really a delegated agent in the hands of Jehovah to execute His will, and the evils with which he assails Job are outward evils. The picture is quite different from that of the "Archangel rumined," or the devil, or Satan, of later theology.

The question then arises as to the special source of the conception of the devil as a fallen and evil spirit. The explanation commonly given of this conception by our modern critical schools is that it sprang out of the interplay of the Jews with the Persians during their period of exile. In the Persian, or Iranian, mythology it is well known that a personal power of evil was conspicuously recognized. The Iranian religion divided the world between the "sons of God" to present himself before the Lord. He is the image of justice, restlessness, and envy—the willing messenger of evil to Job; but he is not represented as the impersonation of evil, or as a spiritual assailant of the patriarch. He is really a delegated agent in the hands of Jehovah to execute His will, and the evils with which he assails Job are outward evils. The picture is quite different from that of the "Archangel rumined," or the devil, or Satan, of later theology.

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But it is also certain that this belief amongst the Jews was one of gradual growth, and is not to be traced in the Old Testament in any such definite form as we first meet with it in the New. The expression "Sathan" is indeed found in the Old Testament, but only five times, if so frequently, as a proper name,—thrice in the book of Job (i. 6, 12; ii. 1), once in the opening of the 21st chap. of 1 Chronicles (although here the allusion to a distinct personality is lost, p. 351). In all the other places where the word occurs, "Sathan" is used in its common sense of "adversary," a sense in which it also occurs in the Gospels, in the well-known passage (Matt. xvi. 23) where our Lord addresses St. Peter, "Get thee behind me, Satan, or "adversary." The books of Chronicles and Zechariah are indisputably amongst the latest writings of the Old Testament; and, although the date of Job is unsettled, it may also be presumed to belong to a late period in the history of revelation. In the earlier prophetic literature of the Hebrews there is no recognition of any spirit of evil at war with Jehovah. All power and dominion are, on the contrary, clearly ascribed to Jehovah himself, who is supreme in heaven, on earth, and under the earth. The connection of Satan with the serpent in the garden of Eden in Genesis (xi. 1-7) is an inference of later dogmatic opinion, arising probably out of the use of the expression "Old Serpent" applied to Satan in Rev. (xx. 2), but receives no countenance from the scriptural narrative itself, which speaks of the serpent purely as an animal, and pronounces a curse against him with reference to his animal nature solely. The idea of a distinct personality of evil, therefore, is not to be found in the earlier Hebrew Scriptures, and is, in fact, inconsistent with the cardinal principle of the older Hebrew theology that Jehovah was the sole source of all power, the author both of good and evil, who hardened Pharaoh's heart (Exod. x. 27), and sent a lying spirit among the prophets of Ahah (I Kings xxii. 20-3). Even in the later Scriptures in which "Sathan" is spoken of as a distinct person, there is little or no analogy betwixt what is said of such a person in these Scriptures and what is said of him in the New Testament. The "Sathan" of the book of Job is described as coming among the "sons of God" to present himself before the Lord. He is the image of justice, restlessness, and envy—the willing messenger of evil to Job; but he is not represented as the impersonation of evil, or as a spiritual assailant of the patriarch. He is really a delegated agent in the hands of Jehovah to execute His will, and the evils with which he assails Job are outward evils. The picture is quite different from that of the "Archangel rumined," or the devil, or Satan, of later theology.

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The process by which the Jewish mind worked out this conception and the whole scheme of demonology found in the New Testament was of course gradual. The Book of
DEVIL

Wisdom, a product of Alexandrian-Jewish thought in the 2d century before Christ, which speaks of the devil having "through every introduced evil into the world" (II. 21), is supposed to represent a stage in this development; and the apocryphal books of Enoch and Esdras (IV.), the former of which is pre-Christian, indicate further stages. Another stage is supposed to be marked by the recognition of a "devil," or evil spirit, under the name of Asmodeus, in the book of Tobit (150 n.c.) There is certainly a remarkable analogy between parts of the eschatological teaching of the book of Enoch and other apocryphal books and that of the gospels. But the development of Jewish theology as a whole, in the ages immediately antecedent to Christianity, is still involved in considerable obscurity, and it is difficult to say how much of the eschatology and demonology of the New Testament is to be regarded as original, and how much as derived or inherited from prior modes of thought.

It must also be conceded that, even should we accept the modern critical theory of the rise of the New Testament conception of the devil and of demons, there is much in it that must be pronounced very different from the Zoroastrian or Iranian conception. The devil of the gospels is in some respects very unlike the Ahiram of Zoroastranism. He is in no sense a twin-creator of man. He has no original share in him, and no right to his homage. In the Persian system the warfare of good or evil is a warfare of balanced forces. But the evil personality of the New Testament, powerful as he is, and always the enemy of the divine, is yet a subordinated and inferior being. He is the tempter of the Son of God and the enemy of man. He has power on earth, and even a certain power over the Son of man, and yet the Son can restrain and bid him get behind Him. The subordinated forces of evil—the demons—are all subject to Christ. They hear His word and obey it. In short, the devil of the New Testament is, in comparison with the source of evil recognized by Zoroastranism, a limited power. He is a subordinated although insurrectionary spirit, working by spiritual means upon the heart of man, and in no sense a native power having an original or creative hold of him. This sets the evangelical conception on a higher level than the Persian, and proves that the Jewish mind, supposing that it did borrow certain impulses from the Iranian dualism with which it came in contact in the period of exile, yet wrought out the conception in the depth of its own religious and moral consciousness within the sphere of revealed truth which was his great educational truth.

The idea of an evil personality was therefore so far a native growth of the Jewish mind, working upon hints contained, although not developed, in the earlier Hebrew Scriptures. It is evident from various passages, both of the Pentateuch (Lev. xvi. 17; Deut. xxxii. 17) and of the prophetic books and the Psalms (Isa. xxii. 21, xxxiv. 14; Jer. xv. 36; Ps. civ. 37), that the Hebrews were cognizant of evil beings supposed to dwell in darkness and waste places. The names applied to these beings in the passages referred to are various, sometimes seirim—lit. goats (Lev. xvi. 7; Isa. xiii. 21), and sometimesadem (Deut. xxxii. 17), probably a name for demons, both phrases being translated "devils" in our authorized version of the Pentateuch. This translation suggests later associations; but much expression plainly denote a belief in evil beings, the survival, probably, in the Hebrew consciousness of fragments of an older native faith which defied the powers of evil as well as of good. Some have traced a similar survival in the name Azazel, translated in our version "scape-goat" (Lev. xvi. 5, 10, 26), and which has been supposed to represent an evil being haunting the desert, to which was devoted the goat sent away on the great day of atonement. This opinion is disputed by others on grounds both philological and theological. But it may be almost certainly assumed that, with all the jealous monotheism of the Jews, there was an undergrowth of darker conceptions, pointing to evil existences opposed to the divine, and to some extent the later idea of the devil springing out of this natural growth in the Hebrew mind of an evil side to nature and to life. This process of growth may have been greatly aided by contact with the Persian dualism, and especially the idea of a kingdom and hierarchy of evil powers seems to have been indebted to this source. But it was also largely original, and at the end, as at the beginning, the Jewish and Christian conceptions of the devil and his angels were very distinct from those of the Persian faith. They belong to a higher level of thought, and are the product of a more advanced stage of moral and spiritual feeling.

The idea of the devil so clearly expressed in the New Testament passed as a dominant factor into the early Christian theology, acquiring for many centuries an always deeper hold on the popular religious imagination. In the writings of the fathers of the 2d and 3d centuries the devil plays an important part. The whole of the Roman imperial system, and all that opposed the progress of the gospel, was identified with his kingdom. Satan was the "prince of this world," he was the devil and the demon, he was held by reason of his sin in nether possession, and man could only be rescued from his power by the ransom of Christ's blood. This extraordinary idea of a payment or satisfaction to the devil being made by Christ as the price of man's salvation is found both in Irenaeus (Adv. Haer., v. 1.1) and in Origen, and may be said to have held its sway in the church for nearly a thousand years. And yet Origen is credited with the opinion that, bad as the devil was, he was not altogether beyond hope of pardon. In this as in other respects the early Alexandrian school showed a milder and broader type of thought than the prevailing theology of the church. Occasionally in later times the milder opinion was expressed, as by Gregory of Nyssa in the 4th century; but gradually it vanished, and the devil was drawn by the theologian's pencil in darker and more terrible forms. Augustine greatly helped to strengthen and confirm the darker view, and to give in this as in other things a gloomier tinge to religious thought. During the Middle Ages the belief in the devil was absorbing—saints conceived themselves and others to be in constant conflict with him. It is hardly possible for us now, as M. Revilliei says in his short treatise on the subject, "to imagine to what a degree this belief controlled men's whole lives. It was the one fixed idea with every one, particularly from the 15th to the 18th century—the period at which we may consider this superstition to have reached its climax." The superstition showed certainly but slight signs of yielding in the 15th, or even in the 16th or 17th centuries. Luther lived in a constant consciousness of contact and opposition with the evil one. At his study, in bed, or in his cell, the devil was incessantly interfering with his work or rest. As he was going to begin his studies he heard a noise which he immediately interpreted as proceeding from his enemy. "As I found he was about to begin again, I got together my books and got into bed. Another time in the night I heard him above my cell walking in the cloister; but as I knew it was the devil I paid no attention to him and went to sleep." Again he says: "Early this morning, when I awoke the fiend came and began disputing with..."
me. 'Thou art a great sinner,' said he. 'I replied, 'Canst
 thou not tell me something new, Satan?''

This realism of belief in an evil power near to man, and
constantly assailing him, continued more or less all through
the 17th century, and was especially strong, as Mr Buckle
has shown in his well-known volumes, in Scotland. He
has said that every house in his picture; but he presents
at the same time indisputable facts which leave no doubt that
the clergy and people alike imagined that "the devil was
always and literally at hand"—that he was haunting them,
speaking to them, and tempting them. Go where they
would he was there." With the rise of a rationalistic
temper throughout Europe, in the 18th century, this belief
in the pervading influence of diabolic agency began to
disappear. The sense of the supernatural decayed in all
directions, and especially the old belief in the arbitrary
control exercised by an evil power over human destiny.

And while the religious upheave has gained greatly since
then, and shown renewed vigour both in an evangelical and
catholic direction, it cannot be said that the earlier faith in
the operations of a personal devil has acquired reascendency.
It may be still the prevailing opinion of Christendom that
there is an evil power working in the world opposed to the
divine; but whether this power is personal, or how far it
ouches the human will, or again, whether there is a
subterranean kingdom of demons with a prince of demons
or devil at their head, and how far such a kingdom has any
relation to human destiny, are all questions that must be
held to be very unsettled, or maintained with very doubtful
confidence in any section of the Christian church. It is
our business simply to note such a change in the attitude
of Christian belief, and not to express any opinion as to its
advantage or otherwise. It is too much to speak with M.
Reville of Satan as a "fallen majesty;" but the idea of
the devil certainly no longer buks in Christian thought as
it once did, nor is his reign the recognized influence that
it once was over human life and experience. (c. t.)

DEVIl PISH, or Sea Devil, (Lepidopus piscatorius), an
Acanthopterygian fish belonging to the family Pecudulacis,
so named from its hideous aspect, produced mainly by the
enormous size of its head in proportion to the rest of its
body. The latter tapers off rapidly towards the tail, and
gives, the creature the appearance of a gigantic tadpole—a
resemblance to which it owes the name of frog-fish, applied
to it from the earliest times. The test of the mouth is
also exceedingly wide, measuring 14 inches in a specimen
47 feet long, and when the mouth is open the lower jaw
protrudes beyond the upper, while both jaws are armed
with several rows of formidable teeth. The pectoral fins
are broad, and are rendered conspicuous by the prolonga-
tion of the carpal bones to which they are attached; the
ventral fins are palpate, and are placed far forward on the
body. The sea devil is a sluggish fish, and, being at the
same time exceedingly voracious, is said to have recourse
to stratagem in order to satisfy its inordinate appetite.
Three anterior dorsal spines, isolated from the others, and
attached to the head in front of the eyes, are so modified
as to form long filiform appendages, two of these being
articulated to the skull by means of a bony ring, and thus
capable of being moved in all directions by appropriate
muscles, while the end of the front tentacle is broad and
flattened, and of a shining, silvery aspect. Concealing
itself in the mud of the sea-bottom, it waves these tentacles
aloft, and the silvery extremity of the front filament acts
as a bait in tempting the smaller fishes to approach near
enough to be seized by the capacious jaws beneath. On this
account the creature has received the name of angler, or
fishing frog. The lobes, which form a fringe around the
anterior part of the body, probably perform, although in a
ruiner degree, the same function as the angling apparatus
on the head. Although its prey is usually taken at the
bottom, it has been known to ascend and float upon the
surface of the water in search of food, and thus sometimes
to capture sea fowl. Not unfrequently, also, it lays hold
on cod or other fish as these are being drawn up hooked
to the fisherman's line, and when caught with other fishes in
the net it studiously enlarges as many as possible of its
fellow-prisoners. As a food fish the sea devil is value-
less, but as the process of its digestion proceeds but slowly,
the fishermen often capture it for the fish contained in its
stomach. Couch tells of one which, when opened,
contained nearly three-fourths of a hundred of herrings, all
of them fit for the market. It attains a length of 5 feet,
orlinary specimens measuring about 3 feet. It is an
inhabitant of the seas of the temperate regions of Europe,
North America, Asia, and Africa.

DEVISE. See WILL.

DEVIZES, a municipal and parliamentary borough and
market town of England, in North Wilts, situated on the
Kennet and Avon canal, 86 miles from London. It
stands on a plateau in the centre of the county, near the
northern limit of Salisbury Plain. The town, which is of
considerable antiquity, consists of a market-place with
streets diverging therefrom. Some of the houses retain
their antique timber construction. In the middle of the
market-place there stands a large cross erected by Lord
Sidmouth in 1815. The principal public buildings are the
town hall, the corn exchange (a spacious and handsome
building), the county jail, the Beul Charity school,
and the churches. St John's Church dates from the reign
of Henry I., but has received numerous additions and
repairs, and was restored in 1863; it belongs to the Norman
Perpendicular style of architecture. The building is com-
plete, with nave, transept, chancel, and chapter chapels.
St Mary's is also of ancient origin, but was mostly rebuilt
in the 18th century. Besides these there are chapels
belonging to the various nonconformist bodies. Devices
at one time was famous for its woollen manufactories, but
these have long been discontinued, and the only articles
now manufactured are silk and snuff. Ale is also brewed. There is,
however, a large trade in grain carried on; and the Devices
corn-market is one of the most important in the west of
England. The town is said to have taken its name after the
erection of the formidable castle which once stood there.
Thus fortress was built about the year 1132 by Bishop Roger of Salisbury,
in the reign of Henry I. In 1138 it was seized by Stephen in
his campaign against the bishops, and three years
thereafter was taken and held by Robert Fitz Herbert on
behalf of Queen Maud. He did not, however, retain
possession of it for any length of time. It was eventually
dismantled in 1576. During the wars of the common-
wealth Devices was unsuccessfully besieged by Waller in
1643, but was taken by Fairfax and Cromwell two years
later. It received its borough charter from Maud under
the name of De Fies; and it is governed by a mayor, 6
aldermen, and 18 town councillors. It was the seat of Edward
III. It was represented in Parliament by two members, but
the Reform Act of 1868 reduced its representation to one
member. The borough, which has an area of 907 acres,
is divided into two wards—north and south. Population
in 1851, 6534; and in 1871, 6536.

DEVONPORT, a municipal and parliamentary borough of
England, in the county of Devon, contiguous to the
towns of East Stonehouse and Plymouth, the seat of one
of the royal dockyards, and an important naval and
military station. It is situated immediately above Ply-
mouth Sound, occupying a triangular peninsula formed by
Stonehouse Pool on the east and the Hamoaze on the west.
The town proper is enclosed by a line of ramparts 12 feet
Ligh, protected by a ditch of about 15 feet in depth, excavated out of the solid limestone. Three gates—the Stonehouse gate, the Stoke barrier, and the North barrier—afford communication respectively with East Stonehouse, Stoke, and Morice Town, the last two being suburbs of Devonport. The streets are laid out with regularity, and are paved with a peculiarly white limestone that gives an air of great cleanliness to the town. A copious supply of water is provided by means of a conduit from Dartmoor. The public buildings are both handsome and numerous. The town hall, erected in 1821–22 partly after the design of the Parthenon, is distinguished by an elegant Doric portico, while near it are the public library, in the Egyptian style of architecture, and a conspicuous column or Doric pillar built of Devonshire granite. This monument, which is 100 feet high, was raised in commemoration of the naming of the town in 1824. There are numerous churches belonging to the different religious denominations. Besides the parish church, which is small, several chapels of ease have within the present century been erected in various parts of the town. One of them, a handsome edifice built in 1814–15 at a cost of £24,000, is situated in the dockyards, and was erected for the special use of those employed there. Of the Government buildings the principal are a spacious hospital outside the barriers, the Raglan barracks, and the residences of the military and naval chief officers. On Mount Wise, which is defended by a battery, stands the military residence, or Government house, which is occupied by the commander of the western district, and near at hand is the other residence, the poet admiral’s house Mount Wise itself and the parade form interesting features of the town, and tend greatly to the amenity of the country—the prospect from the former being one of the finest in the south of England. The most noteworthy object, however, in connection with Devonport is the royal dockyard, which extends along the shore of the Hamoaze from Mutton Cove to Keyham Lake, a distance of about 13 miles. The naval dockyard, which formed the nucleus of the town, is situated within the ramparts, and covers an area of 75 acres, with a wharfage of 1,100 yards, while beyond the ramparts, and higher up the Hamoaze, is the more recently constructed Keyham steam yard, connected with the former by means of a tunnel 900 yards long. Keyham steam yard occupies an area of 100 acres; and its docks are built of granite. In connection with the dockyards are the gun wharf, and extensive store-houses and factories. The number of hands employed in the works is very large, varying from 3,000 to 4,000, according to circumstances, and it may be said that, with the exception of a brewery in the suburb of Morice Town, the only manufacturing of the place is that belonging to the Government. The history of Devonport is of comparatively recent date. After the outbreak of war with France in 1689 William III. established an arsenal there in connection with the neighbouring naval station of Plymouth, and it received the name of Plymouth Dock. Its proportions were, however, somewhat limited until 1761 and in 1771 extensive additions were made, and since then it has steadily increased in importance. In 1824 it received its present distinctive name, and by the Reform Act of 1832 it was erected into an independent borough returning 2 members to Parliament. The municipal borough, which is co-extensive with the parish of Stoke-Damerel, is subdivided into 6 wards, and covers an area of 1700 acres. The town is governed by a mayor, 12 aldermen, and 33 councillors, and has a separate commission of the peace. The ground on which Devonport stands is for the most part the property of the St Aubyn family, whose steward holds a court leet and a court baron annually. The population of the municipal borough was, in 1821, 35,190; in 1861, 50,440; and in 1871, 49,449; the males being slightly more numerous than the females. The population of the Parliamentary borough in 1871 was 61,634. See PlymouTH AND DOCKYARDS.

DEVONSHIRE, one of the south-western counties of England, the third in extent in the country, being exceeded only by York and Lincoln. According to the latest survey, it contains 1,394,852 acres—equal to about 2402 square miles. On the N. and W. the county is bounded by the Bristol Channel, on the S. by the English Channel; on the W. it adjoins Cornwall, on the E. Dorset and Somerset. In form, Devonshire is very irregular; but it sends out one long promontory towards the S., and on the N. the coast line tends sharply southward near Ilfracombe, and is broken into the deep hollow of Budeford Bay.

General aspect—Nearly the whole area of Devonshire is uneven and hilly. It contains the highest land in England, south of the Yorkshire Ingleborough, and the scenery, much varied, is in most parts of the county very striking and picturesque. The most conspicuous is the granite district of Dartmoor, so named from the principal river which rises on it, the Dart, and occupying an area of about 130,000 acres. This great plateau, the mean height of which is about 1500 feet, rises in the southern division of the county, and is more or less conspicuous from all the lower tracts. It is the highest and easternmost in a broken chain of granite elevations, which extends to the Scilly Islands. Steep heights, crested with masses of broken granite, locally named torrs, break up from the main table land in all directions, and are often singularly fantastic in outline. The highest of these is Yester, 2050 feet, in the northern quarter; whilst one of the most conspicuous is Haytor, 1501 feet, in the south. Dartmoor is a region of heather, and the central portion has been a royal forest from a period before the Conquest. Its grand wastes contrast finely with the wild but wooded region which immediately surrounds the granite (and which occurs the most picturesque scenery in Devonshire), and with the rich cultivated country lying beyond. It is this rich country which has given Devonshire the name of the Garden of England. The most notable districts are the so-called Vale of Exeter, covering an area of about 200 square miles, and including the meadows which surround Crediton, the richest in the county, and the South Hams, the extent of which is not very clearly defined, but which covers the deep projection between the mouths of the Dart and the Erme. Another very picturesque division extends eastward of Exeter as far as the Dorsetshire border. The north and south coasts of the county differ much in character and climate, the north being by far the more bracing. Both have grand cliff and rock scenery, not exceeded by any in England or Wales, and, as a rule, the country immediately inland is of great beauty. The general verdure of Devonshire, and its broken hilly character, are the features which everywhere most strongly attract themselves. The least picturesque part of the country is that toward the centre, which is occupied by some portions of the Carboniferous formation.

The principal rivers rise on Dartmoor, and are—the Tegn, the Dart, the Plym, and the Tavy, falling into the English Channel, and the Taw and the Torridge, flowing northwards Budeford bay. The lesser Dartmoor streams are the Avon, the Erme, and the Yealm, all running south. The Exe rises on Exmoor in Somersetshire, but the main part of its course is through Devonshire (where it gives name to Exeter), and it is joined on its way to the English Channel by the lesser streams of the Combe of the Otter, running on the Blackdown hills, also runs S., and the Axe, for part of its course, divides the
The geological formations of Devonshire are of course the main cause of the general appearance of the county. Dartmoor, as has been said, is a granite region. By far the greater part of central Devon is occupied by Carboniferous rocks, consisting chiefly of sandstones, often siliceous, and of slates. All this formation has been subjected to great disturbances, and the strata (as may be seen on every part of the coast between Boscastle and the mouth of the Taw), are twisted in a manner which defies description, the result being some very extraordinary and picturesque cliff scenery. True coal does not exist, but anthracite occurs near Bideford. These rocks are also associated with trappean and other ashes, which bear a striking analogy to those of existing volcanoes. Underlying the carbonaceous deposits are the sandwacke or Devonian rocks, forming the extreme north of the county, and great part of the South Hams. They extend west of Plymouth, and cover the greater part of Cornwall. These rocks are generally held to be the equivalents of the "Old Red" system, although the characteristic Old Red rocks, so largely developed in Scotland, Herefordshire, and elsewhere, are not found at all in Devonshire. The Devonian rocks consist of clays, slates, grey limestones, brown sandstones, and flag. The fossils of the two series also differ; but although these Devonians offer many complexities, their other differences seem capable of explanation. The third great formation of Devonshire is the New Red, which occupies much of the eastern portion of the county, extends along the coast from Sidmouth to Torbay, and sends out a long spur westward into the Carboniferous district. The upper beds of the series consist principally of marls, the middle of sandstones, and the lower of breccias or coarse conglomerates, coloured red by peroxides of iron. The formation is characterized by a scarcity of organic remains, and by the extreme fertility of some of its soils.

At or near the junction of the Carboniferous and New Red formations, from Washfield, near Tiverton, on the N. to Haldon on the S., occur numerous masses of igneous rock, feldspathe traps. These traps are for the most part excellent building stones, and many of the quarries have been worked for ages. Greensand strata cap the Blackdown hills, and the heights near Axminster, Seaton, and Sidmouth, and with beds of chalk, occupy a depression in the coast at Beer (near the eastern border of Devonshire), coming down to the level of the sea at Beer Head. A very interesting and remarkable Tertiary deposit, belonging to the Lower Miocene period, occurs at Bovey Tracy, below the eastern escarpment of Dartmoor. It consists of beds of lignite, clay, and sand, with an aggregate thickness of more than 100 feet. In the lignite at least 50 species of plants have been found, all indicating a extreme north of the county, and of the Devonian series, the only living species of which are to be found in California. Great lumps of impregnated resin occur occasionally. The clay which overlies the lignite is of much more modern date, and contains leaves of the dwarf birch, now an alpine plant, and of 3 species of willow, which all belong to the genus Salix, of which are to be found in California. Hard traps, which occur in many places, are also much used, as are the limestones of Buckfastleigh and of Plymouth. The Rother stone, used from an early period in Devonshire churches, is found near Tavistock, and is a hard, porphyraceous stone, taking a fine polish. Excellent roofing slates occur in the Devonian series round the S. part of Dartmoor. The chief quarries are near Ashburton.

The counties of Devon and Dorset. These eastern streams are comparatively slow and sluggish. The Dartmoor rivers, rapid, darting, and rocky, are famous trout streams. None have courses of any great length.

The metals—The minerals of Devonshire are principally tin and copper. Iron occurs, but to no great extent. The silver-lead mines at Combe Martin on the N. coast, and at Deer Alston, on the Devonshire side of the Tamar, were formerly worked to advantage; but the former have long been abandoned, and the latter, since 1860, have been swamped by water from the river, under the bed of which the principal mine extended. The has been found on Dartmoor (in stream works) from an unknown period. Copper was not much worked before the end of the last century. Tin occurs in the granite of Dartmoor, and along its borders, but rather where the Devonian than where the Carboniferous rocks border the granite. It is found most plentifully in the district which surrounds Tavistock, which, with tin and other ores, is in effect the greatest copper mine of the world, and by far the largest and most profitable in the kingdom. The divided profits during this period amounted to £1,152,560. But the mining interests of Devonshire are affected by the same causes, and in the same way, as those of Cornwall. The quantity of ore has greatly diminished, and the cost of removing it from the deep mines prevents competition with foreign markets. In many mines tin underlies the general depth of the copper, and is worked when the latter has been exhausted. The metallic character of the Tavistock district is indeed very mixed, and besides tin and copper, ores of zinc and iron are largely distributed, but these have as yet received no great attention. At the Devon Great Consols more than 2000 tons of refined arsenic are annually produced by elimination from the pyrites contained in the various lodes. This amount is calculated to be about one-third of the arsenic produced throughout Europe. Manganese occurs in the neighbourhood of Exeter, in the valley of the Teg, and in N. Devon; but the most profitable mines, which are shallow, are, like those of tin and copper, in the Tavistock district.

The other mineral productions of the county consist of marbles, building-stones, and porphyrites, and clays and slates. Clays occur in the Carboniferous series at Chudleigh and elsewhere, but of very inferior character and beauty to those among the Devonian rocks, at Ilples, Babacombe near Torquay, and Plymouth. These are largely worked, and are used extensively in the decoration of churches and other buildings. Among building stones, the granite of Dartmoor holds the foremost place. It is much quarried near Princes Town, near Moreton Hampstead on the N. of Dartmoor, and elsewhere. The annual export is considerable. There are also very large and ancient quarries of a chalky greensand at Beer, near the eastern border of the county. This is an excellent building stone, and composed of carbonates of lime, mixed with argillaceous and silaceous matter, and with particles of greeu silicate of iron. Hard traps, which occur in many places, are also much used, as are the limestones of Buckfastleigh and of Plymouth. The Rother stone, used from an early period in Devonshire churches, is found near Tavistock, and is a hard, porphyraceous stone, taking a fine polish. Excellent roofing slates occur in the Devonian series round the S. part of Dartmoor. The chief quarries are near Ashburton.
ton and Plymouth (Cann quarry), but none of them are so extensive or important as those at Delabole in Cornwall. Potter's clay is worked at King's Tegnow, whence it is largely exported, at Bovey Tracy, and at Watcombe near Torquay. The Watcombe clay is rated the finest quality, and is capable of retaining the most delicate form. China clay or kaolin, is found on the S. side of Dartmoor, at Lee Moor, and near Trowlesworthy. There is a very large deposit of under, as yet little known, close to Ashburton.

Climate — The climate varies greatly in different parts of the county but everywhere it is more humid than that of the eastern or south-eastern parts of England. Both Devon and Cornwall have a mean annual temperature about 1°5 above that of the midland counties; but in the summer they are cooler than the whole range of country to the E. The Bay of Biscay is far more bracing under convict labour, and the more sheltered nooks (as at Bovey), are made at Buckfastleigh and at Ashburton, and the factories employ many hands. At Tiverton there is an extensive lace-making factory. The manufacture of hosiery lace, made by hand on the pillow, is now confined to Beer and some other villages on the S.E. coast. Shoes and boots, chiefly for export, are made at Crediton. The greatest industrial works in the county, however, are the vast Government establishments at Plymouth and Devonport—the victualling yard, and the dockyard. The convict prisons in Dartmoor may also be regarded as an industrial establishment. They were built for French prisoners in 1809, and in 1850 were adapted for receiving convicts. Since that year more than 100 acres, round the prisons have been brought into cultivation under convict labour, and 1,000 acres more were added to the tenon lands in 1871. In addition to the old buildings, a large prison, arranged on the latest principles, was erected in 1872.

The fisheries of Devonshire are in no way so important as those of Cornwall. About 200 trawlers belong to the ports of Brixham, the head quarters of the fishermen of Tor Bay, and mark out the coasts in their seasons, but not in the vast shools known farther west. It may be said that trawling is the main feature of the Devonshire fishery whilst smuggling and driving characterize that of Cornwall.

History — The British tribes inhabiting this western portion of the island are called Dumnonia by Ptolemy, and Durnania, or Dumnonia, the Latinized name of a kingdom which long remained independent after the arrival and early conquests of the West Saxons, seems to be identical with the Cymry Dyfnsaint, which survives in the present Devon. The Saxons settlers, as they advanced into the country, called themselves Dofanas, i.e., men of Devon or Dyfnsaint, thus adopting the British name, and indicating the broad difference between their settlements in such a district as Devon, where British influence so long survived, and where they came as Christians, and those in southern or eastern England, where the Britons were either expelled or exterminated. In Devonshire the Christian Britons became subjects of the Christian Saxons.

The Celtic element can be traced from the Somersetshire Axe, the last heathen frontier, to the extremities of Cornwall, of course increasing in amount as we reach the lands which were more recently conquered, and therefore less perfectly Teutonized. Devonshire is less Celtic than Cornwall, and Somersetshire is less Celtic than Devonshire; but not one of the three counties can be called a pure Teutonic land, like Kent or Norfolk (E. A. Freeman). Celtic names are accordingly found in various parts of Devonshire, and especially on Dartmoor, side by side with those which are truly Saxon.

For some time after the landing of William I. and the battle of Hastings, the western counties remained undisturbed. In the spring of 1068 Exeter was besieged and taken by the Conqueror, who built a castle there, which was besieged in 1131 by Stephen for three months. In 1499 Exeter, which was Lancaster's, was besieged for twelve days by the Yorkists, but held out successfully, and in 1497 the city was again besieged by Perkin Warbeck. A more...
DEVSOMSHIRE

important siege occurred in 1549, when the western counties rose in defence of what was called the "old religion." This lasted for 35 days. Both Exeter and Plymouth were besieged for many months during the civil war of the Commonwealth. This was a period of considerable disturbance in the west. The golden age of Devonshire is, however, that of Elizabeth. Drake, Hawkins, Raleigh, and the Gilberts, besides a host of others, were all of Devonshire; and the history of the country at that time is bound up with the story of its harbours and seaside towns, and is in close connection with the general history of England. It was from Plymouth that the English ships sailed for the attack and dispersion of the Armada, the near approach of which was there first made certain. The landing of William of Orange at Bruxham, November 5, 1688, is perhaps the event most fraught with important results which has taken place in the western counties.

Antiquities — In primeval antiquities Devonshire is not so rich as Cornwall; but Dartmoor abounds in remains of the highest interest, the most peculiar of which are the long parallel alignments of upright stones, which, a special feature, resemble the Eoliths of Brittany. Of Dartmoor the lines are invariably straight, and are found in direct connection with burial mounds. The most famous cromlech is the "Spouter's Rock" at Drewsteignton, a three-piled cromlech which may well be compared with those of Cornwall. There are numerous menhirs or single upright stones; a large dolmen or holed stone lies in the bed of the Teign, near the Scorhill circle; and rock basins occur on the summits of nearly every tor on Dartmoor (the largest are on Kestor, and on Heltor, above the Teign). It is, however, tolerably evident that these have been produced by the gradual disintegration of the granite, and that the dolmen in the Teign is due to the action of the river. Clusters of hut foundations, circular, and formed of rude granite blocks, are frequent; the best example of such a primitive village is at Batworthy, near Chagford, the type resembles that of East Cornwall. Walled enclosures, or pounds, occur in many places, Grummond is the most remarkable. Trackways, or boundary lines, run across Dartmoor in many directions, and the rude bridges, formed of great slabs of granite, deserve notice. All these remains are of Dartmoor. Some of the more numerous large hill castles and camps,—all earthworks, and all apparently of the British period—Roman relics have been found from time to time at Exeter (Isca Daniornorum), the only large Roman station in the county.

Buildings — The churches are for the most part of the Perpendicular period, dating from the middle of the 14th to the end of the 16th century. Exeter Cathedral is of course an exception, the whole (except the Norman towers) being very beautiful Decorated work. The special features of Devonshire churches, however, are the richly carved pulpits and chancel screens of wood, in which this county excels other counties in England, with the exception of Norfolk and Suffolk. The designs are rich and varied, and the skill displayed often very great. Granite crosses are frequent, the finest and earliest being that of Coplestone, near Crediton. Monastic remains are scanty; the principal fragments are those at Tor, Buckfast, Tavistock, and Buckland ABBEYS. Among domestic buildings the exceptions of Wear Gifford (15th century), Bradley (16th century), Dartington (15th), Bradfield (Elizabethan), and Holcombe Rogus (Elizabethan) deserve notice. The ruined castles of Okehampton (Edward I.), Exeter (with vast British earthworks), Berry Pomeroy (Henry III.), and with ruins of a large Tudor mansion, Totnes (Henry III.), and Compton (earily 15th century), are all interesting and picturesque.

The dioceses of Devonshire belong, of course, to the West Saxon division; but the mixture of races here was, as has been said, considerable; and in the language as well as in the folk-lore of the people Celtic words and ideas are found closely united with those of Teutonic origin.

The episcopal see for Devonshire was at first established at Crediton, in 997. The ancient Cornish see, which had existed during the British independence of Cornwall, was afterwards united to that of Crediton; and in 1050 the place of the united sees was removed by the Confessor from Crediton to Exeter. There was no further change until 1876, when the Cornish see was again separated from that of Devonshire, and the place of it fixed at Truro. The diocese of Exeter is now therefore confined to Devonshire.

Devonshire is in the western circuit, and the assizes are held at Exeter. It has one court of quarter sessions and 22 petty sessions divisions—The city of Exeter, a county of itself, and the boroughs of Barnstaple, Bideford, Dartmouth, Devonport, Plymouth, South Molton, Tiverton, Tiverton, Totnes have commissions of the peace, and, with the exception of Totnes, separate courts of quarter sessions. The jurisdiction of the court of the vice-warden of the stannaries extends over the county of Devon as well as that of Cornwall. There are 25 lieutenancy subdivisions. For the purposes of parliamentary election, Devonshire is divided into east, north, and south—each of which divisions returns 2 county members. The city of Exeter, in East Devon, returns 2; Barnstaple and Tiverton, in North Devon, 2 each; Devonport and Plymouth, in South Devon, 2 each, and Tavistock, also in South Devon, returns 1 member. There are thus altogether 17 members returned for Devonshire.

One of the earliest railways in England was that from Plymouth to the prisons at Prince Town on Dartmoor, opened in 1826. It was, and is, used only by horse cars. The county is now well intersected by railways. Of canals, the most important (and, except "Morton's Leam," running from near Peterborough to the sea, the most ancient in England) is the Exeter Canal, cut in the reign of Henry VIII, and extended in 1826. It is about six miles in length, and connects the city of Exeter with the mouth of the river Exe. Tiverton is connected with Tavistock on the Grand Western Canal, 25 miles long; and the canal completed in 1817 connects Tavistock with the Tamar. The principal gentlemen's seats in Devonshire are Saltram (earl of Morley), Marston (Sir Massey Lopes, Bart.), Kitley (Baldwin Bastard, Esq.), Stover (duke of Somerset), Ugbrooke (Lord Clifford), Haldon (Sir Lawrence Falk, Bart.), Manhead (Sir Lidstone Newman, Bart.), Powderham Castle (earl of Devon), Killerton (Sir Thomas Acland, Bart.), Bicton (Lady Rolle), Castle Hill (Earl Fortescue), Tawstock (Sir Bourchier Wrey, Bart.), and Eggesford (earl of Portsmouth). There are many lesser houses noticeable for beauty of situation or for the ornamental grounds in which they stand. Of these by far the most remarkable are Endleigh (duke of Bedford), near Totnes, commanding some of the finest scenery in the upper valley of the Tamar, and Buckland Court, on the Dart (Baldwin Bastard Esq.).

The principal towns in the county are those already mentioned as returning members to Parliament, or as possessing courts of quarter sessions. Besides these are the watering-places of Tegnymouth, Torquay, and Ilfracombe, and the smaller towns of Crediton, Honiton, Axminster, Ashburton, and Newton Abbot.

Population.—The total population of Devonshire in 1851 amounted to 567,998 persons; in 1861 to 584,373; and in
1871 to 601,374, of whom 285,248 were males, and 316,126 females. There were, at the last census, on an average 0.36 persons to an acre, or 2.75 acres to each person. The number of inhabited houses was 105,206. There were 450 parishes and 33 hundreds. The population of the county in 1801 was 310,308 persons; so that the increase since that time has been at the rate of 77 for every hundred. Of the 52 counties in England and Wales, Devonshire is next in the north in point of population. The comparative density of the population is considerably below the average. In England generally there are 389 persons to every square mile: in Devonshire the number is not more than 252.

**Bibliography** — The best general history of the county is still that which forms part of *Lyons' Modern Britain* (1822). Polwhele's *Milt of Devon* (1793-98) was never completed, and is inaccurate. West's *Survey of Devon*, written about 1830, and first printed in 1846, is curious and important. Prince's *Workings of Devon*, a valuable book, was first published in 1701, and was reprinted in 1810. Oliver's *Monumentum Devonse* (1845) is valuable for the history of the monastic foundations in both Devon and Cornwall. There are very good histories of Plymouth (1871) and of Devonport (1872) by R. N. Wash; *My Bay's Borders of the Tower and Torc*, a vol. 3, 1836, is full and interesting, and contains much information relating to Dartmoor. Rowe's *Proceedings of the Forest of Dartmoor* (1814) and a later edition is still the most complete book on the district, but a great amount of important matter relating to Dartmoor and to the county in general will be found in the annual volumes of the *Proceedings of the Devonshire Association for the Promotion of Literature, Science, and Art*, beginning in 1802. The notes to Carrington's poem of *Dartmoor* should also be mentioned. For the provedance of the county reference should be made to the very valuable papers of Mr. Fingley in the *Transactions of the Devonshire Association*, and in the *Journal of the Geological Society*. The papers of Mr. Orme and of Mr. Veysey in the same Journals are also of great import. The fullest general notice is, however, to be found in the *Report on the Geology of Cornwall, Devon*, and *West Somerset*, by Sir H. J. De la B. Beckett, 1839. *Marr's Handbook for Travellers in Devon and Cornwall* (8th ed., 1872) must also be mentioned as full of useful information. (R. J. K.)

**DEVONSHIRE, WILLIAM CAVENDISH, FOURTH EARL AND FIRST DUKE OF (1610–1707)**, distinguished as a statesman and patriot, born in 1640, was the eldest son of the third Earl. After completing his education he made the tour of Europe according to the custom of young men of his rank, being accompanied on his travels by Dr. Kimball. On his return he obtained, in 1651, a seat in Parliament for the county of Derby, and soon became conspicuous as one of the most determined and daring opponents of the general policy of the court. In 1678 he was one of the committee appointed to draw up articles of impeachment against the lord chancellor, Danby. In 1679 he was re-elected for Derby, and made a privy councillor by Charles II; but he soon withdrew from the board with his friend Lord Russell, when he found that the Roman interest uniformly prevailed. He carried up to the House of Lords the articles of impeachment against Lord Chief Justice Saye, for his arbitrary and illegal proceedings in the Court of King's Bench; and when the king declared his resolution not to sign the bill for excluding the duke of York, afterwards James II, he moved in the House of Commons that a bill might be brought for the protection of all his majesty's Protestant subjects. He also openly denounced the king's counsellors, and voted for an address to remove them. He appeared in defence of Lord Russell at his trial, at a time when it was scarcely more criminal to be an accomplice than a witness. After the condemnation he gave the utmost proof of his attachment by offering to exchange clothes with Lord Russell in the prison, remain in his place, and so allow him to effect his escape. In November 1684 he succeeded to the earldom on the death of his father. He opposed arbitrary government under James II, which was at the same time tossed and high spirited as during the previous reign. He was withdrawn from public life for a time, however, in consequence of a hasty and imprudent act of which his enemies knew how to avail themselves. Fancying that he had received an insulting look in the presence chamber from Colonel Cokepepper, a swaggerer whose attendance at court the king encouraged, he immediately avenged the affront by challenging the colonial, and, on the challenge being refused, striking with his cane. This offence was punished by a fine of £30,000, which was an enormous sum even to one of the earl's princely fortunes. Not being able to pay he was imprisoned in the King's Bench, from which he was released only on signing a bond for the whole amount. This was afterwards cancelled by King William. After his discharge the earl went for a time to Chatsworth, where he occupied himself with architectural improvements on his mansion. The Revolution again brought him into prominence. He was one of the seven who signed the original paper inviting the Prince of Orange from Holland, and was the first nobleman who appeared in arms to receive him at his landing. He received the Order of the Garter on the occasion of the coronation, and was made lord high steward of the new court. In 1691 he accompanied King William on his visit to Holland. He was created marquis of Hartington and duke of Devonshire in 1694 by William and Mary, on the same day on which the head of the house of Russell was created duke of Bedford. Thus, to quote Macaulay, "the greatest houses of Russell and Cavendish, which had long been closely connected by friendship and by marriage, by common professions, common sufferings, and common triumphs, received on the same day the highest honour which it is in the power of the Crown to confer."

His last public act was to conclude the union with Scotland, for negotiating which he and his son, the marquis of Hartington, had been appointed among the commissioners by Queen Anne. He died on the 18th August 1707, and ordered the following inscription to be put on his monument —

> Williamus Dominus Dei Devon,\n> Honoris Principum Fidelis Subditus,\n> Inmaculata inveniens Tyran.\n
**DEW.** See **METEOROLOGY**

**DEWBERRY, Rubus canus,** a deciduous, trailing plant, allied to the bramble, of the natural order Rosaceae. It is common in woods, hedges, and the borders of fields in England and other countries of Europe. The leaves are trifoliate, hairy beneath, and of a dusky green, the flowers, which appear in June and July, are white, or pale rose-coloured. The fruit is large, and closely embraced by the calyx, and consists of a few grains, which are black, with a glaucous bloom; it has an agreeable acid taste, and is used for making a kind of wine.

**DEWES, Sir Simon** (1602–1659), antiquarian, chronicler, and collector of historical records, was born at Coiden, in the parish of Claristock, in Dorsetshire, on the 18th December 1602. His father, one of the six clerks of Chancery, possessed a large official income, and gave him a liberal education at the grammar-school of Bury St Edmunds, and at St John's College, Cambridge. Called to the bar in 1629, he did not enter upon practice, being possessed of independent means, and having already resolved to devote himself to historical research. His intention seems to have been to compile a history of Britain from original documents, and in endeavouring to carry it out he spent much of his time in examining historical records, which he describes as "the most ravishing and satisfying part of human knowledge," in the Tower of London and elsewhere. The chief results of this labour were his valuable collection of records—originals and transcriptions—which now form part of the Harleian collection in the British Museum, and his *Journals of all the Parliaments in the reigns of Queen Elizabeth*, which, though completed in
1629, was first published by his nephew, Paul Bowes, in 1682. His means had been considerably increased by his marriage with an heiress in 1629, soon after which he procured the honour of knighthood. One of his many foibles was a desire to establish for himself an aristocratic lineage, and his efforts to do this, in spite of the fact that he is forced to admit, that he does not know to whom his great-grandfather was, are very amusing. In 1639 he became high sheriff of Suffolk, and in 1641 he was made a baronet. In the intervening year he entered the Long Parliament as member for Sudbury. Here he obtained a peculiar place for himself by his whimsicality, and his parade of his knowledge of records, which he quoted at first in nearly every debate, sometimes relevant, but oftener not. He was treated for a time with a sort of amused tolerance, but ultimately his innumerable interferences with the conduct of business had to be checked. He was not a very warm adherent of the cause of the Parliament against the king. Belonging to the Presbyterian section of the Puritan party, he was excluded from the House of Commons by "Pride's Purge" in 1648. He died on the 18th April 1650. The Autobiography and Correspondence of Sir Simon D'Evere, edited by J. O. Halfwell, was published in 1845, and possesses considerable historical value. Much more important, however, are his manuscripts notes of the Long Parliament, describing its sittings between 1640 and 1645 with great graphic power and minuteness of detail. They form five volumes of the Harleian manuscripts in the British Museum, and have been largely drawn upon by John Forster and other writers on the period of the Long Parliament.

DE WETTE, WILHELM MARTIN LEIBRICH (1780–1849), a distinguished German theologian, was born on the 12th January 1780, at Ulla, near Weimar, where his father was clergymen. After receiving his preliminary education at a local school he was sent to the gymnasium at Weimar, a town which was then at the height of its literary glory. Here, as he himself testified in glowing terms many years later, he was much influenced by intercourse with Herder, whom as "ephors" frequently visited the gymnasium and examined the pupils. In 1799 he entered on his theological studies at the university of Jena, his principal teachers being Griesbach and Paulus, from the latter of whom more than any other he derived the tendency to free and uncompromising rationalism of Paulus, and on the other hand his unlettered critical method separated him distinctly from the supernaturalist or strictly orthodox school of interpreters. Thus it has happened that each school has classed him with the followers of the other, as he himself predicted would be the case in the preface to his Christliche Sittenlehre. His works are generally admitted to be marked by great exegetical skill, unusual power of condensation, and uniform fairness. Accordingly they possess an element of permanent value which is little affected by the progress of criticism. The following is a list of the most important of them:

- Beiträge zur Erleuchtung in das Alte Testament (2 vols. 1806–7), Commentar über das Psalmen (1811), which has passed through many editions, and is still regarded as of high authority; Lehrbuch der chrstlichen Theologie (1815), a work of great importance as showing its author's theological position; Lehrbuch der christlichen Geschichtslehre (1812–16); Christliche Sittenlehre (1819–21); Einleitung in das Neue Testament (1829); Religions, ihr Wesen, ihre Erschaffen und ihre Einfluss auf das Leben (1827); Die Welt der christlichen Glauens (1846); and Evangelisches exegetisches Handbuch zum Neuen Testament (1846). De Wette also edited Luther's works.

See Hagenbach in Herzog's Real-Encyclopädie, Lucke's W. M. L. De Wette, zur Freundschaftlicher Erinnerung (1850), and Schenkel's W. M. L. De Wette und die Bedeutung seiner Theologie für unseren Zeit (1849).

DE WINTER, JAN WILLEM (1750–1812), Dutch admiral, was born at the Texel in 1750. He entered the navy at the age of twelve, but after twenty-five years of honourable service he had attained no higher rank than that of lieutenant. In 1787 he took part with the Revolutionists, and on the failure of their efforts fled to France. He then entered the French army, and served under Droumeguer and Pichegru in the campaigns of 1792 and 1793. In 1795 he returned to Holland and was appointed rear-admiral. In the following year he attained the rank of vice-admiral, and was named commander of the fleet at the Texel. The most memorable event in his career was the battle of the Texel, fought on the 11th of October 1795, in which after a gallant struggle the Dutch fleet was defeated.
and the admiral taken prisoner by the English under Admiral Duncan. De Winter was in a few months liberated by exchange; and his conduct in the battle was declared by a council of investigation to have nobly maintained the honour of the Dutch flag. He held the post of minister-plenipotentiary to the French republic from 1798 to 1802, when he resumed the command of the Dutch fleet. He was employed in suppressing the piracies of the Triopolitans, and negotiated a treaty of peace with the Government. He enjoyed the confidence of Louis Napoleon I. By the former he was created count of Huesen and made commander-in-chief of his armies by sea and land; and by the latter he was named grand officer of the Legion of Honour, inspector-general of the coasts of the North Sea, and in 1811 commander of the Texel fleet. De Winter died at Paris, June 2, 1812, and his remains were buried in the Pantheon at the public expense.

DE WITT, CONRADUS (1623–1672), brother of the more celebrated John De Witt, was born at Dort in 1623. In 1650 he became burgomaster of his native town, and member of the states of Holland and West Friesland. He was throughout life closely associated with his brother, whose opinions he shared, and whom he supported with great ability and vigour. Of the eight deputies appointed in 1672 to accompany the naval and military commanders, he was the one selected to go with De Ruyter, and in action he displayed remarkable courage, as he had done under similar circumstances in 1667. Compelled by sickness to leave the fleet, he found on his return to Dort that the revocation of the Perpetual Edict had been signed by his fellow magistrate. He was forced in his sick-room to follow their example, but added after his name the initials V.C. (v. coactis). See next article.

DE WITT, JOHN (1625–1672), an illustrious Dutch statesman, was born at Dort in 1625. He was carefully educated, and early displayed remarkable talents. A work entitled Elementa Linearum Curvarum, published in 1650, is attributed to him. His father was a member of the States General of Holland and West Friesland, and well known as a bitter opponent of the house of Orange, which had gradually acquired almost regal functions. William II., prince of Orange, died in 1650; and as his son, afterwards William III. of England, was an infant, the Republican party easily won predominance. De Witt was made penurious of Dort, and in that position so distinguished himself by his eloquence, firmness, and sagacity, that in 1652, although only twenty-seven years of age, he became grand pensionary of Holland. He held this position for about twenty years, during which he controlled the policy of the United Provinces. He inherited his father's intense jealousy of the Orange family, and steadily laboured to prevent it from ever again rising to power. When he became grand pensionary the United Provinces were at war with England. He had always disapproved of this conflict, and in 1654 succeeded in bringing about peace, conceding to Cromwell his demands with respect to the honours due to the English flag. The treaty included a secret article providing that no member of the house of Orange should in future be elected stadtholder or grand admiral. De Witt was afterwards accused of having suggested this condition to Cromwell, but the latter was also opposed to the claims of a family which was nearly allied to the Stuarts.

After the restoration of Charles II., who had been exposed to many affronts during his residence in Holland, De Witt cultivated the friendship of France; and in 1661 a treaty was concluded by which that country and the United Provinces granted to each other freedom of commerce in their respective ports,—the Dutch guarantee-
The Orange party so profited by these disasters that the Perpetual Edict was revoked, and Prince William assumed the office of stadtholder. De Witt's policy was thus finally defeated, and he himself became an object of general and intense hatred. All sorts of monstrous charges were brought against him, and believed, and his brother Cornelis was falsely accused of complicity against the life of the stadtholder. Brought to the Hague, Cornelius was there, on July 24, 1672, tortured and condemned to perpetual banishment. In the same town De Witt was assaulted by a band of assassins, who left him lying on the ground under the impression that he was dead. Summoned by a pretended message from Cornelius, De Witt went to visit him in prison, when a mob assembled and murdered the brothers amid circumstances of revolting cruelty.

De Witt is one of the greatest figures of Dutch history. His action in connection with the Triple Alliance proves that he thoroughly understood the central tendencies of European politics; and, whether he is to be praised or blamed for his lifelong opposition to the house of Orange, there can be no doubt as to the greatness and purity of his motives. As an administrator he displayed extraordinary energy and resource; and personally he was a man of steady, upright character, loyal to the last. His Metropolitan, De Witt's successor, was certainly no less a character. Towards the close of the last, and in the early part of the present century, the state was subject to a series of spoliations by Sindba and Holkar, and was only preserved from destruction by the talents and courage of the adoptive mother of the fifth Raja. By a treaty in 1819, Dhar passed under British protection, and bound itself to act in subordinate co-operation. The state was confiscated for rebellion in 1857, but subsequently restored to Raja Anand Rao Fuur, then a minor, with the exception of the detached district of Barwara, which was granted to the Begam of Bhopal. The revenue of the state is estimated at £90,000 per annum, inclusive of jagirs. The military force consists of 275 cavalry, with 600 infantry (including police), 2 guns, and 21 artillery. Road-making is being pushed on. Fifteen schools were attended in 1874 by 550 scholars. Two charitable dispensaries afford gratuitous medical relief. The town of Dhar, situated on the road from Bina (Mhow) to Baroda, extends 2½ miles in length and a mile in breadth, and is surrounded by a mud wall. The fort, built of red stone, forms a conspicuous object outside the city, and contains the Raja's palace.

DHARWAR, a district of British India in the presidency of Bombay, situated between 14° 6' and 15° 33' N. lat., and 74° 50' and 75° 58' E. long. It contains a total area of 4,353 square miles, and a population of 988,037 inhabitants. The district is about 116 miles long, with an average width of 77 miles. It is bounded on the N. by the Belgaum and Kalidgi districts, on the E. by the Nizam's territory and Bellari district, on the S. by Mysore, and on the W. by Belgaum and North Kanara districts. The western portions of the district, in the northwestern quarter of the Sahyadri range, are rugged and hilly; but towards the east, the land falls away into plains of black soil in many parts very fertile and well suited to the growth of cotton, with occasionally a detached peak or group of hills. The chief rivers are the Malprabáh on the north and the Tungabhadra on the south. The hills are principally composed of hornblende and chlorite schists, gneiss, and mica slate, large interstratified beds of silicious and ferruginous schists (as at and near Dhárwár) often forming their ridges. Seams and beds of a crystalline white marble occur, which, near their junction with the hornblende slate, are often coloured green. Gold is found sparingly in the Dumbal hills, and native silver and also iron pyrites. Iron ore is worked to a small extent at Tegur, which was once
a considerable trade in native iron. The most influential classes of the community are Brahmanas and Lingayats. The Lingayats number 860,919, or 44 per cent. of the Hindu population; they worship the symbol of Siva, and males and females both carry this emblem about their person in a silver case. The manufactures of the district are not numerous; they consist of cotton and silk cloth, glass bracelets, and articles of ironware. In four towns of the district cotton and mixed silk and cotton fabrics, for male and female attire, are delicately and tastefully woven. Agriculture is the chief industry of the district, the principal products being cotton, exotic and native관피, molasses, and oil of various kinds. Of a total of 1,662,040 acres of Government arable and assessed land, 1,550,235 acres were in 1874 under cultivation as follows—rice, 90,836 acres; cotton, 283,810; गोल, 497,312, लाल, 6126; wheat, 112,169, sugar cane, 2909; tobacco, 790, \textit{td} seed, 29,467; linseed, 7966, gram, 23,411; miscellaneous products, 294,491, fallow land, 182,569 acres. The cotton trade of Dharwar has great commercial importance. The land revenue realized in 1873 amounted to £196,064. The district contains six municipalities.

The territory comprised within the district appears at the earliest recorded period to have formed part of the Brahmanal realm of Vypyanagar. On the overthrow of the king of Talikot in 1605, the lands of Dharwar became part of the Musulman kingdom of Bajapur. In 1675 the district seems to have been overrun and partially conquered by Sivaji, becoming thereby subject to the king of Satara, and subsequently to the Peshwa. In 1776 the province was overrun by Hyder Ali, the usurping sultan of Mysore. In 1778 Dharwar was taken from the Marhattas by Hyder Ali, and in 1791 taken by a British force. On the final overthrow of the Peshwa in 1818, Dharwar was incorporated with the territory of the East India Company.

DIOLPUR, a native state of Rajputana, in Upper India, under the political superintendence of the British Government, is situated between 26° 30' and 26° 57' N lat., and 77° 32' and 78° 20' E long. The state is bounded on the N. and N.E. by the British district of Agra, on the E. and S. by the Gwalior state, from which it is separated by the Chambal river, and on the W. by the state of Karnaul. It contains an area of about 1600 square miles, and an estimated population of upwards of 500,000 souls. It is a crop-producing country, without any special manufactures. All along the bank of the Chambal the country is deeply intersected by ravines; low ranges of hills in the western portion of the state supply inexhaustible quarries of fine-grained and easily-worked red sandstone. The chief, who has the title of Rana, belongs, like most of his subjects, to the tribe of Dervah Jats, who are believed to have formed a portion of the Indo-Scythian wave of invasion which swept over Northern India about 100 A.D. The earliest recorded ancestor of the family is one Jeyt Suh, who in 1068 held certain territories south of Alwar. His descendant in 1605, Singan Deo, having distinguished himself in an expedition against the frontiers of the Deccan, was rewarded by the sovereignty of the small territory of Gohad, with the title of Rana. The family gradually extended their possessions until they included 56 estates, yielding an annual revenue of about £36 lakhas of rupees (£60,000). Upon the defeat of the Marhattas at Panmat in 1761, Rana Bhim Singh, the tenth in descent from Rana Singan Deo, seized upon the fortress of Gohar. Political relations between the Rana and the East India Company commenced in 1779 during the Marhatta war, when an offensive and defensive alliance was entered into. The Rana joined the British forces against Sindhia, on receiving a promise that, at the conclusion of peace between the English and the Marhattas, all the territories then in his possession should be guaranteed to him, and protected from invasion by Sindhia. This protection was subsequently withdrawn, the Rana in being guilty of treachery. In 1785, Madhop Singh succeeded in recapturing the fortress of Gohar, and crushed his Jat opponent by seizing the whole of Gohad. In 1803, however, the family were restored to their ancestral possessions of Gohad by the British Government, but, owing to the opposition of Sindhia, the Rana agreed to relinquish possession of Gohad, in exchange for his present territory of Dholpur. By the treaty of 1804, the state was taken under the protection of the British Government, the chief becoming bound to act in subordinate cooperation with the paramount power, and to refer all disputes with neighbouring princes to the British Government. The annual revenue of Dholpur, including pagars, amounts to about £110,000. The military force consists of 2000 men. The town of Dholpur is situated on the Agra and Gwalior road.

DIABETES (from \\textit{dia}, through, and \textit{ Bates}, to pass), a disease characterized by a habitually excessive discharge of urine. Two forms of this complaint are described, viz. Diabetes Melliitus, or Glycosuria, where the urine is only increased in quantity, but also contains a greater or less amount of sugar, and Diabetes Insipidus, or Polymiaz, where the urine is simply increased in quantity, and contains no abnormal ingredient. The former of these is a disease to which the term diabetes is most commonly applied, and is by far the more serious and important ailment. Although sometimes classed by medical writers among diseases of the kidneys, diabetes melilitus is rather to be regarded as a constitutional disorder. Its cause is still a matter of uncertainty, but there is sufficient evidence to connect it with a defect in the process of the assimilation of food, more especially that stage in which the function of the liver is concerned. The important researches of Claude Bernard, and subsequently those of Schick, Hurler, Pavy, M'Donnell, and others, have shown that this organ, besides the secretion of bile, has the additional function of forming in large quantity a substance to which the names of glycogen, dextrose, or amylloid substance have been given. This matter is capable of being converted by the action of ferments into glucose, or grape sugar, and such a change is supposed by some to take place normally in the blood where the sugar thus formed is consumed by oxidation in the process of the circulation, while by other authorities it is held that the glycogen is not directly converted into sugar, but is transformed into other compounds.

The theories of diabetes founded on these views describe its production either to an excessive formation of glycogen or to some defect in its transformation, the result being that grape sugar passes out of the body by the kidneys. It has long been known, both by experiment and by observation in disease, that injuries to certain parts of the nervous system, particularly the floor of the fourth ventricle in the brain, and that portion of the sympathetic nerve which sends branches to the liver and regulates its blood supply, are followed by the appearance of sugar in the urine. Hence certain pathologists seek an explanation for the disease in a morbid state of the parts of the nervous system whereby these nerves are either overstretched or paralyzed and the flow of blood through the liver temporarily or permanently increased. It must, however, be remarked that, although in some instances the portions of the nervous system above mentioned are found after death to be involved in disease, this is by no means the case; and in many cases of diabetes the post mortem appearances are entirely negative. While, therefore, considerable light
has by modern research been thrown upon this disease, its pathlogy cannot be regarded as settled. See Nutrition.

It ought to be mentioned that small quantities of sugar are frequently found in the urine in many diseases, and even in health after articles of food rich in sugar or starch have been eaten, as also in some forms of poisoning.

Little is known regarding the exciting causes of diabetes. Exposure to wet and cold, private depressions, overwork, emotions, or mental overwork, the abuse of alcohol and of saccharine and starchy substances, have all been assigned as causes. It appears to be in some instances hereditary. It is most common among adults, and occurs much more frequently in males than in females.

The symptoms of diabetes are usually gradual in their onset, and the patient may suffer for a length of time before he thinks it necessary to apply for medical aid. The first symptoms which attract attention are failure of strength, and emaciation, along with great thirst and an increased amount and frequent passage of urine. From the normal quantity of from two to three pints in the twenty-four hours it may be increased to 10, 20, or 50 pints, or even more. It is usually of pale colour, and of thicker consistence than normal urine, possesses a decidedly sweet taste, and is of high specific gravity (1.03 to 1.05). It frequently gives rise to considerable irritation of the urinary passages.

By simple evaporation crystals of sugar may be obtained from diabetic urine, which also yields the characteristic chemical tests of sugar, while the amount of this substance can be accurately estimated by certain analytical processes. The quantity of sugar passed may vary from a few ounces to two or more pounds per diem, and it is found to be markedly increased after saccharine or starchy food has been taken. Sugar may also be found in the blood, saliva, tears, and in almost all the excretions of persons suffering from this disease. One of the most distressing symptoms is intense thirst, which the patient is constantly seeking to allay, the quantity of liquid consumed being in general enormous, and there is usually, but not invariably, a voracious appetite. The mouth is always parched, and a faint, sweetish odour may be evolved from the breath. The effect of the disease upon the general health is very marked, and the patient becomes more and more emaciated. He suffers from increasing muscular weakness, the temperature of his body is lowered, the skin is dry and hard, the teeth are loosened or decay, while dyspepsia, symptoms of constipation, and loss of sexual power are common accompaniments.

In general great mental depression or irritability.

Diabetes as a rule advances comparatively slowly except in the case of young persons, in whom its progress is apt to be rapid. Various complications arise in the course of the disease, among which may be mentioned cataract, various cutaneous eruptions, kidney diseases, inflammatory chest affections, and especially pulmonary consumption, which is one of the most frequent modes of fatal termination in diabetes. Occasionally death occurs suddenly from exhaustion.

Diabetes is a very fatal form of disease, recovery being exceedingly rare. Nevertheless much may be done by appropriate treatment to mitigate the severity of the symptoms and to prolong life.

Cases may thus continue for years without material change to the worse, and in some rare instances it would seem that the disease is cured. The unfavourable cases are chiefly those occurring in young persons, also where serious chest or other complications arise, and especially where the disease itself is of severe character, the quantity of sugar passed being persistently large, and the patient losing flesh and strength rapidly. With respect to the treatment of diabetes, the regulation of the diet has by all authorities been regarded as a matter of the first importance, inasmuch as it has been proved beyond question that certain kinds of food have a powerful influence in aggravating the disease, more particularly those consisting largely of saccharine and starchy matter; and it may be stated generally that the various methods of treatment proposed aim at the elimination of these constituents from the diet. Hence it is recommended that such articles as bread, potatoes, and all farinaceous foods, turnips, carrots, parsnips, and most fruits should be avoided; while animal food and soups, green vegetables, milk, cream, cheese, eggs, butter, and tea and coffee without sugar, may be taken with advantage. As a substitute for ordinary bread, which most persons find it difficult to do without for any length of time, bran bread, gluten bread, almond biscuits, and even well-browned toast or rusks are recommended. Alcoholic stimulants are of little or no use, but if prescribed should be in those forms containing the least saccharine matter, such as claret, Burgundy, brandy, or bitter ale.

Thirst may be mitigated by iced water, or water slightly acidulated with phosphoric acid. The employment of a diet consisting entirely of skimmed milk has been recommended by Dr Donkin of London, who has obtained good results from this method of treatment. The milk is administered in quantities of from 8 to 12 pints in the twenty-four hours, all other articles of diet being excluded. The plan of treatment once proposed, of administering sugar in large quantity in diabetes, proved to be highly injurious, and is now abandoned.

Numerous medicinal substances have been employed in diabetes, but few of them are worthy of mention as possessed of any efficacy. Opium is often found of great service, its administration being followed with marked amelioration in all the symptoms, and, according to some high authorities, with cure of the disease. It is borne in diabetes in larger doses than usual, and from 5 to 12 grains or more may be taken in the twenty-four hours. In like manner codlin (one of the constituents of opium), in doses of half a grain increased to two or three grains three times a day, has been used with good effect.

In most cases, however, it is the dieting of the patient to which the physician has to look in dealing successfully with this formidable disease; and sufferers ought always to be impressed with the necessity of strictly abstaining from those articles of food which by general consent are known to exercise a hurtful influence in aggravating the symptoms.

In diabetes insipidus, there is constant thirst and an excessive flow of urine, which, however, is not found to contain any abnormal constituent. Its effects upon the system are often similar to those of diabetes mellitus, except that they are much less marked, the disease being in general very slow in its progress. In some cases the health appears to suffer very slightly. It is rarely a direct cause of death, but from its debilitating effects may predispose to serious and fatal complications. Little is known as to its pathology, but it is generally supposed to own a similar origin to diabetes mellitus. It is best treated by tonic and generous diet. Opium and valerian have been found beneficial. (I. o. A.)

DIAGORAS, born at Melos, was a writer of dithyrambic poetry. Religious in his youth, he became an atheist because a great wrong done upon him (the details of which are unknown) was left unpunished by the gods. In consequence of his blasphemous speeches, and especially from his publication of the Mysteries, he was condemned to death at Athens, and a price set upon his head. During his flight he perished by shipwreck. Aristophanes alludes to his atheism in the Clouds, 830 epy., and to his condemnation in the Birds, 1073. His date is not exactly known.
Diagrams and Views.

In order to express completely by a purely graphical method the relations of magnitudes involving more than two variables, we must use more than one diagram. Thus in the arts of construction we use plans and elevations and sections through different planes, to specify the form of objects having three dimensions.

In such systems of diagrams we have to indicate that a point in one diagram corresponds to a point in another diagram. This is generally done by marking the corresponding points in the different diagrams with the same letter. If the diagrams are drawn on the same piece of paper we may indicate corresponding points by drawing a line from one to the other, taking care that this line of correspondence is so drawn that it cannot be mistaken for a real line in either diagram.

In the stereoscope the two diagrams, by the combined use of which the form of bodies in three dimensions is recognized, are projections of the bodies taken from two points so near each other that, by viewing the two diagrams simultaneously, one with each eye, we identify the corresponding points intuitively.

The method in which we simultaneously contemplate two figures, and recognize a correspondence between certain points in the one figure and certain points in the other, is one of the most powerful and fertile methods hitherto known in science. Thus in pure geometry the theories of similar, reciprocal, and inverse figures have led to many extensions of the science. It is sometimes spoken of as the method or principle of Duality.

Diagrams in Kinematics.

The study of the motion of a material system is much assisted by the use of a series of diagrams representing the configuration, displacement, and acceleration of the parts of the system.

Diagram of Configuration.

In considering a material system it is often convenient to suppose that we have a record of its position at any given instant in the form of a diagram of configuration. The position of any particle of the system is defined by drawing a straight line or vector from the origin, or point of reference, to the given particle. The position of the particle with respect to the origin is determined by the magnitude and direction of this vector.

If in the diagram we draw from the origin (which need not be the same point of space as the origin for the material system) a vector equal and parallel to the vector which determines the position of the particle, the end of this vector will indicate the position of the particle in the diagram of configuration.

If this is done for all the particles, we shall have a system of points in the diagram of configuration, each of which corresponds to a particle of the material system, and the relative positions of any pair of these points will be the same as the relative positions of the material particles which correspond to them.

We have hitherto spoken of two origins or points from which the vectors are supposed to be drawn—one for the material system, the other for the diagram. These points, however, and the vectors drawn from them, may now be omitted, so that we have on the one hand the material
system and on the other a set of points, each point corresponding to a particle of the system, and the whole representing the configuration of the system at a given instant.

This is called a diagram of configuration.

Diagram of Displacement.

Let us next consider two diagrams of configuration of the same system, corresponding to two different instants.

We call the first the initial configuration and the second the final configuration, and the passage from the one configuration to the other we call the displacement of the system. We do not at present consider the length of time during which the displacement was effected, nor the intermediate stages through which it passed, but only the final result—a change of configuration. To study this change we construct a diagram of displacement.

Let $A$, $B$, $C$ be the points in the initial diagram of configuration, and $A'$, $B'$, $C'$ be the corresponding points in the final diagram of configuration.

From $O$, the origin of the diagram of displacement, draw a vector $oa$ equal and parallel to $AA'$, $ob$ equal and parallel to $BB'$, $oc$ to $CC'$, and so on. The points, $a$, $b$, $c$, $x_c$, will be such that the vector $ab$ indicates the displacement of $b$ relative to $a$, and so on. The diagram containing the points $a$, $b$, $c$, $x_c$, is therefore called the diagram of displacement.

In constructing the diagram of displacement we have hitherto assumed that we know the absolute displacements of the points of the system. For we are required to draw a line equal and parallel to $AA'$, which we cannot do unless we know the absolute final position of $A$, with respect to its initial position. In this diagram of displacement there is, therefore, besides the points $a$, $b$, $c$, $x_c$, an origin, $O$, which represents a point absolutely fixed in space. This is necessary because the two configurations do not exist at the same time; and therefore to express their relative position we require to know a point which remains the same at the beginning and end of the time.

But we may construct the diagram in another way which does not assume a knowledge of absolute displacement or of a point fixed in space.

Assuming any point and calling it $a$, draw $ab$ parallel and equal to $A_1A_2$ in the initial configuration, and from $b$ draw $bb'$ parallel and equal to $A_2A_3$ in the final configuration. It is easy to see that the position of the point $b$ relative to $a$ will be the same by this construction as by the former construction, only we must observe that in this second construction we use only vectors such as $A_1A_2$, $A_2A_3$, which represent the relative position of points both of which exist simultaneously, instead of vectors such as $A_1A_2$, $B_2B_3$, which express the position of a point at one instant relative to its position at a former instant, and which therefore cannot be determined by observation, because the two ends of the vector do not exist simultaneously.

It appears therefore that the diagram of displacements, when drawn by the first construction includes an origin $O$, which indicates that we have assumed a knowledge of absolute displacements. But no such point occurs in the second construction, because we use such vectors only as we can actually observe. Hence the diagram of displacements without an origin represents neither more nor less than all we can ever know about the displacement of the material system.

Diagram of Velocity.

If the relative velocities of the points of the system are constant, then the diagram of displacement corresponding to a measurement of a unit of time between the initial and the final configuration is called a diagram of relative velocity.

If the relative velocities are not constant, we suppose another system in which the velocities are equal to the velocities of the given system at the given instant and constant for a unit of time. The diagram of displacements for this imaginary system is the required diagram of relative velocities of the actual system at the given instant.

It is easy to see that the diagram gives the velocity of any one point relative to any other, but cannot give the absolute velocity of any of them.

Diagram of Acceleration.

By the same process by which we formed the diagram of displacements from the two diagrams of initial and final configuration, we may form a diagram of changes of relative velocity from the two diagrams of initial and final velocities. This diagram may be called that of total accelerations in a finite interval of time.

By the same process by which we deduced the diagram of velocities from that of displacements we may deduce the diagram of rates of acceleration from that of total acceleration.

We have mentioned this system of diagrams in elementary kinematics because they are found to be of use especially when we have to deal with material systems containing a great number of parts, as in the kinetic theory of gases.

The diagram of configuration then appears as a region of space swarming with points representing molecules, and the only way in which we can investigate it is by considering the number of such points in unit of volume in different parts of that region, and calling this the density of the gas.

In like manner the diagram of velocities appears as a region containing points equal in number but distributed in a different manner, and the number of points in any given portion of the region expresses the number of molecules whose velocities lie within given limits. We may speak of this as the velocity-density.

Path and Hodograph.

When the number of bodies in the system is not so great, we may construct diagrams each of which represents some property of the whole course of the motion.

Thus if we are considering the motion of one particle relative to another, the point on the diagram of configuration which corresponds to the moving particle will trace out a continuous line called the path of the particle.

On the diagram of velocity the point corresponding to the moving particle will trace another continuous line called the hodograph of the particle.

The hodograph was invented and used with great success by Sir W. R. Hamilton as a method of studying the motions of bodies.

Diagrams of Stress.

Graphical methods are peculiarly applicable to statical questions, because the state of the system is constant, so that we do not need to construct a series of diagrams corresponding to the successive states of the system.

The most useful of these applications relates to the equilibrium of plane framed structures. Two diagrams are used, one called the diagram of the frame and the other called the diagram of stress.

The structure itself consists of a number of separate pieces or links jointed together at their extremities. In practice these joints have friction, or may be made purposely stiff, so that the force acting at the extremity of a piece may not pass exactly through the axis of the joint; but as $r$ is unsafe to make the stability of the structure depend in any degree upon the stiffness of joints, we assume in our calculations that all the joints are perfectly smooth, and therefore that the force acting on the end of any link passes through the axis of the joint.
The axes of the joints of the structure are represented by points in the diagram of the frame.

The link which connects two points in the actual structure may be of any shape, but in the diagram of the frame it is represented by a straight line joining the points representing the two joints.

If no force acts on the link except the two forces acting through the centres of the joints, these two forces must be equal and opposite, and their direction must coincide with the straight line joining the centres of the joints.

If the force acting on either extremity of the link is directed towards the other extremity, the stress on the link is called pressure and the link is called a strut. If it is directed away from the other extremity, the stress on the link is called tension and the link is called a tie.

In this case, therefore, the only stress acting in a link is pressure or a tension in the direction of the straight line which represents it in the diagram of the frame, and all that we have to do is to find the magnitude of this stress.

In the actual structure, gravity acts on every part of the link, but in the diagram we substitute for the actual weight of the different parts of the link, two weights which have the same resultant acting at the extremities of the link.

We may now treat the diagram of the frame as composed of links without weight, but loaded at each joint with a weight made up of portions of the weights of all the links which meet in that joint.

If any link has more than two points we may substitute for it in the diagram an imaginary stiff frame, consisting of links, each of which has only two joints.

The diagram of the frame is now reduced to a system of points connected by a set of straight lines, and each point is in general acted on by a weight or other force acting between it and some point external to the system.

To complete the diagram we may represent these external forces as links, that is, to say, straight lines joining the points of the frame to points external to the frame. Thus each weight may be represented by a link joining the point of application of the weight with the centre of the earth.

But we can always construct an imaginary frame having its joints in the lines of action of these external forces, and this frame, together with the real frame and the links representing external forces, which join points in the one frame to points in the other frame, make up together a complete self-stressed system in equilibrium, consisting of polyls connected by links acting by pressure or tension.

We may in this way reduce any real structure to the ease of a system of points with attractive or repulsive forces acting between certain pairs of these points, and keeping them in equilibrium.

The direction of each of these forces is sufficiently indicated by that of the line joining the points, so that we have only to determine its magnitude.

We might do this by calculation, and then write down on each link the pressure or the tension which acts in it.

We should in this way obtain a mixed diagram in which the stresses are represented graphically as regards direction and position, but symbolically as regards magnitude.

But we know that a force may be represented in a purely graphical manner by a straight line in the direction of the force containing as many units of length as there are units of force in the force. The end of this line is marked with an arrow head to show in which direction the force acts.

According to this method each force is drawn in its proper position in the diagram of configuration of the frame. Such a diagram might be used as a record of the result of calculation of the magnitude of the forces, but it would be of no use in enabling us to test the correctness of the calculation.

But we have a graphical method of testing the equilibrium of any set of forces acting at a point. We draw in series a set of lines parallel and proportional to these forces. If these lines form a closed polygon the forces are in equilibrium. We might in this way form a series of polygons of forces, one for each joint of the frame. But in so doing we give up the principle of drawing the line representing a force from the point of application of the force, for all the sides of the polygon cannot pass through the same point, as the forces do.

We also represent every stress twice over, for it appears as a side of both the polygons corresponding to the two points between which it acts.

But if we can arrange the polygons in such a way that the sides of any two polygons which represent the same stress coincide with each other, we may form a diagram in which every stress is represented in direction and magnitude, though not in position, by a single line which is the common boundary of the two polygons which represent the points at the extremities of the corresponding piece of the frame.

We have thus obtained a pure diagram of stress in which no attempt is made to represent the configuration of the material system, and in which every force is not only represented in direction and magnitude by a straight line, but the equilibrium of the forces at any joint is manifest by inspection, for we have only to examine whether the corresponding polygon is closed or not.

The relations between the diagram of the frame and the diagram of stress are as follows —

To every link in the frame corresponds a straight line in the diagram of stress which represents in magnitude and direction the stress acting in that link.

To every joint of the frame corresponds a closed polygon in the diagram, and the forces acting at that joint are represented by the sides of the polygon taken in a certain cyclical order. The cyclical order of the sides of the two adjacent polygons is such that their common side is traced in opposite directions in going round the two polygons.

The direction in which any side of a polygon is traced is the direction of the force acting on that joint of the frame which corresponds to the polygon, and due to that link of the frame which corresponds to the side.

This determines whether the stress of the link is a pressure or a tension.

If we know whether the stress of any one link is a pressure or a tension, this determines the cyclical order of the sides of the two polygons corresponding to the ends of the links, and therefore the cyclical order of all the polygons, and the nature of the stress in every link of the frame.

Definition of Reciprocal Diagrams.

When to every point of concourse of the lines in the diagram of stress corresponds a closed polygon in the skeleton of the frame, the two diagrams are said to be reciprocal.

The first extensions of the method of diagrams of forces to other cases than that of the funicular polygon were given by Rankine in his Applied Mechanics (1857). The method was independently applied to a large number of cases by Mr. W. P. Taylor, a practical draughtsman in the office of the well-known contractor Mr. J. B. Cochran, and by Professor Clerk Maxwell in his lectures in King's College, London. In the Phil. Mag. for 1864 the latter pointed out the reciprocal properties of the two diagrams, and in a paper on "Reciprocal Figures, Frames, and Diagrams of Forces," Trans. R. S. Edinburgh, vol. xxv. (1870), he showed the relation of the method to Ayr's function of stress and to other mathematical methods.

Professor Fleming Jenkin has given a number of applications of the method to practice (Trans. R. S. Edin., vol. xxvii.)
Diagrams

The linkwork may be fixed at O. If any figure is traced by F, Q will trace the inverse figure, but turned round O through the constant angle POQ.

In the diagram forces FP, FQ are balanced by the force O0 at the fixed point. The forces FP and FQ are necessarily inversely as OP and OQ, and make equal angles with those lines.

Every closed area formed by the links or the external forces in the diagram of configuration is marked by a letter which corresponds to a point of concourse of lines in the diagram of stress.

The stress in the link which is the common boundary of two areas is represented in the diagram of stress by the line joining the points corresponding to those areas.

When a link is divided into two or more parts by lines crossing it, the stress in each part is represented by a different line for each part, but as the stress is the same throughout the link, these lines are all equal and parallel. Thus in the figure the stress in RV is represented by the four equal and parallel lines HI, FG, UE, and AB.

If two areas have no part of their boundary in common the letters corresponding to them in the diagram of stress are not joined by a straight line. It, however, a straight line were drawn between them, it would represent in direction and magnitude the resultant of all the stresses in the links which are cut by any line, straight or curved, joining the two areas.

For instance the areas F and C in fig. 1 have no common boundary, and the points F and C in fig. 2 are not joined by a straight line. But every path from the area F to the area C in fig. 1 passes through a series of other areas, and each passage from one area into a contiguous area corresponds to a line drawn in the diagram of stress. Hence the whole path from F to C in fig. 1 corresponds to a path formed of lines in fig. 2 and extending from F to C, and the resultant of all the stresses in the links cut by the path is represented by FC in fig. 2.

Automatic Description of Diagrams.

There are many other kinds of diagrams in which the two co-ordinates of a point in a plane are employed to indicate the simultaneous values of two related quantities.

If a sheet of paper is made to move, say horizontally, with a constant known velocity, while a tracing point is made to move in a vertical straight line, the height varying as the value of any given physical quantity, the point will trace out a curve on the paper from which the value of that quantity at any given time may be determined.

This principle is applied to the automatic registration of phenomena of all kinds, from those of meteorology and terrestrial magnetism to the velocity of cannon-shot, the vibrations of sounding bodies, the motions of animals, voluntary and involuntary, and the currents in electric telegraphs.

Indicator Diagram.

In Watt's indicator for steam engines the paper does not move with a constant velocity, but its displacement is proportional to that of the piston of the engine, while that of the tracing point is proportional to the pressure of the steam. Hence the co-ordinates of a point of the curve traced on the diagram represent the volume and the pressure of the steam in the cylinder. The indicator diagram not only supplies a record of the pressure of the steam at each stage of the stroke of the engine, but indicates the work done by the steam in each stroke by the area inclosed by the curve traced on the diagram.

The indicator-diagram was invented by James Watt as a method of estimating the work done by an engine. It was afterwards used by Clausenron to illustrate the theory of

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Diagram 1: Diagram of Configuration

Diagram 2: Diagram of Stress

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Cremona (Le figure reciproche nella statica grafica, Milan, 1872) has deduced the construction of reciprocal figures from the theory of the two components of a wrench as developed by Möbius.

Cullmann, in his Graphische Statik, makes great use of diagrams of forces, some of which, however, are not reciprocal.

Mr. A. T. Bayly in his Staticque Graphique (Paris, 1874) has treated the whole subject in an elementary but copious manner.

Mr. R. H. Bow, C.E., F.R.S.E., in his work on The Economics of Construction in relation to Framed Structures, 1873, has materially simplified the process of drawing a diagram of stress reciprocal to a given frame acted on by a system of equilibrating external forces.

Instead of lettering the joints of the frame, as is usually done, or the links of the frame, as was the writer's custom, he places a letter in each of the polygonal areas inclosed by the links of the frame, and also in each of the divisions of surrounding space as separated by the lines of action of the external forces.

When one link of the frame crosses another, the point of apparent intersection of the links is treated as if it were a real joint, and the stresses of each of the intersecting links are represented twice in the diagram of stress, as the opposite sides of the parallelogram which corresponds to the point of intersection.
heat, and this use of it was greatly developed by Rankine in his work on the steam engine.

The use of diagrams in thermodynamics has been very completely illustrated by Prof. J. Willard Gibbs (Connec-
ticut Acad. Sci., vol. iii), but though his methods throw much light on the general theory of diagrams as a method of study, they belong rather to thermodynamics than to the present subject. (T. C. M.)

DIA—DIA

DIAALLING, sometimes called gnomonics, is a branch of applied mathematics which treats of the construction of sun-dials, that is, of those instruments, either fixed or portable, which determine the divisions of the day by the motion of the shadow of some object on which the sun's rays fall.

It must have been one of the earliest applications of a knowledge of the apparent motion of the sun; though for a long time men would probably be satisfied with the division into morning and afternoon as marked by sun-rise, sun-set, and the greatest elevation.

The earliest mention of a sun-dial is found in Isaiah xxviii. 8: "Behold, I will bring again the shadow of the degrees which is gone down in the sun-dial of Ahaz ten degrees backward." The date of this would be about 700 years before the Christian era, but we know nothing of the character or construction of the instrument.

The earliest of all sun-dials of which we have any certain knowledge was the hemicycle, or hemisphere, of the Chal­dean astronomer Berosus, who probably lived about 340 B.C. It consisted of a hollow hemisphere placed with its rim perfectly horizontal, and having a bead, or globule, fixed in any way at the centre. So long as the sun remained above the horizon the shadow of the bead would fall on the inside of the hemisphere, and the path of the shadow during the day would be approximately a circular arc. This arc, divided into twelve equal parts, deter­mined twelve equal intervals of time for that day. Now, supposing this were done at the time of the solstices and equinoctes, and on as many intermediate days as might be considered sufficient, and then curve lines drawn through the corresponding points of division of the different arcs, the shadow of the bead falling on one of these curve lines would mark a division of time for that day, and thus we should have a sun-dial which would divide each period of daylight into twelve equal parts.

These equal parts were called temporary hours, and, since the duration of daylight varies from day to day, the temporary hours of one day would differ from those of another; but this inequality would probably be disregarded at that time, and especially in countries where the variation between the longest summer day and the shortest winter day is much less than in our climates.

The dial of Berosus remained in use for centuries. The Ar­abians, as appears from the work of Albategnius, still followed the same construction about the year 900 A.D. Four of these dials have in modern times been found in Italy. One, discovered at Tivoli in 1746, is supposed to have belonged to Cicero, who, in one of his letters, says that he had sent a dial of this kind to his villa near Tusculum. The second and third were found in 1751—one at Castel Nuovo, and the other at Rigone; and a fourth was found in 1762 at Pompeii. G. H. Martini, the author of a dissertation in German on the dials of the ancients, says that this dial was made for the latitude of Memphis; it may therefore be the work of Egyptians, perhaps constructed in the school of Alexandria.

It is curious that no sun-dial has been found among the antiquities of Egypt, and their sculptures give no indication of any having existed. It has, however, been supposed that the numerous obelisks found everywhere were erected in honour of the sun and employed as gnomons.

Hercodotus has recorded that the Greeks derived from the Babylonians the use of the gnomon, but the great pro­gress made by the Greeks in geometry enabled them in later times to construct dials of great complexity, some of which remain to us, and are proofs, not only of extensive knowledge, but also of great ingenuity.

Ptolemy's Syntaxis treats of the construction of dials by means of his analemma, an instrument which solved a variety of astronomical problems. The constructions given by him were sufficient for regular dials, that is, horizontal dials, or vertical dials facing east, west, north, or south, and these are the only ones he treats of. It is certain, however, that the ancients were able to construct declining dials, as is shown by that most interesting monument of ancient gnomonics—the Tower of the Winds—which is still in existence at Athens. This is a regular octagon, on the edges of which eight principal winds are represented, and over them eight different dials—four facing the cardinal points and the other four facing the intermediate directions. The date of the dials is long subsequent to that of the tower, for Vitruvius, who describes the tower in the sixth chapter of his first book, says nothing about the dials, and as he has described all the dials known to him in his time, we must believe that the dials of the tower did not then exist. The tower and its dials are described by Stuart in his Antiquities of Athens. The hours are still the temporary hours, or, as the Greeks called them, stetemora.

As already stated, the learning and ingenuity of the Greeks enabled them to construct dials of various forms—among others, dials of suspension intended for travellers; but these are only spoken of and not explained; they may have been like our ring-dials.

The Romans were neither geometers nor astronomers, and the science of gnomonics did not flourish among them. The first sun-dial erected at Rome was in the year 290 B.C., and this Pappus Cursor had taken from the Samnites. A dial which Valerius Messalla brought from Carthage, the latitude of which is five degrees less than that of Rome, was placed in the forum in the year 261 B.C. The first dial actually constructed at Rome was in the year 164 B.C., by order of Q. Marcus Philippus, but, as no other Roman has written on gnomonics, this was perhaps the work of a foreign artist. If, too, we remember that the dial found at Pompeii was made for the latitude of Mem­phis, and consequently less adapted to its position than that of Carthage to Rome, we may infer that mathematical knowledge was not cultivated in Italy.

The Arabians were much more successful. They attached great importance to gnomonics, the principles of which they had learned from the Greeks, but they greatly simplified and diversified the Greek constructions. One of their writers, Abul-Hassan, who lived about the beginning of the 15th century, taught them how to trace dials on cylindrical, conical, and other surfaces. He even intro­duced equal or equinoctial hours, but the idea was not sup­ported, and the temporary hours alone continued in use.

Where or when the great and important step already conceived by Abul-Hassan, and perhaps by others, of reckoning by equal hours was generally adopted cannot now be determined. The history of gnomonics from the 13th to the beginning of the 16th century is almost a blank, and during that time the change took place. We
can see, however, that the change would necessarily follow the introduction of clocks and other mechanical methods of measuring time; for, however imperfect those were, the hours they marked would be of the same length in summer and in winter, and the discrepancy between these equal hours and the temporary hours of the sun dial would soon be too important to be overlooked. Now, we know that a balance clock was set up in the palace of Charles V. of France about the year 1370, and we may reasonably suppose that the new sun-dials came into general use during the 14th and 15th centuries.

Among the earliest of the modern writers on gnomonics must be named Sebastian Münster, a cordelier who published his *Horologographus* at Basle in 1531. He gives a number of correct rules, but without demonstrations. Among his inventions was a moon-dial, but this does not admit of much accuracy.

During the 17th century dailing was discussed at great length by all writers on astronomy. Clavius devotes a chapter and a quarter of 500 pages entirely to the subject. This was published in 1612, and may be considered to contain all that was known at that time.

In the 18th century clocks and watches began to supersede sun-dials, and these have gradually fallen into disuse except as an additional ornament to a garden, or in remote country districts where the old dial on the church tower still serves as an occasional check on the modern clock by its shadow.

The art of constructing dials may now be looked upon as little more than a mathematical recreation.

**General Principles.**—The diurnal and the annual motions of the earth are the elementary astronomical facts on which dialling is founded. That the earth turns upon its axis uniformly from west to east in 24 hours, and that it is carried round the sun in one year at a nearly uniform rate, is, we know, the correct way of expressing these facts. But the effect will be precisely the same, and it will suit our purpose better, and make our explanations easier, if we adopt the ideas of the ancients, of which our senses furnish apparent confirmation, and assume the earth to be fixed.

Then, the sun and stars revolve round the earth's axis uniformly from east to west once a day,—the sun lagging a little behind the stars, making its day some 4 minutes later, so that at the end of the year it finds itself again in the same place, having made a complete revolution of the heavens relatively to the stars from west to east.

The fixed axis about which all these bodies revolve daily is a line through the earth's centre, but the radius of the earth is so small, compared with the enormous distance of the sun, that, if we draw a parallel axis through any point of the earth's surface, we may safely look on that as being the axis of the celestial motions. The error in the case of the sun would not, at its maximum, be more than 6 p.m. or 6 a.m., exceed half a second of time, and at noon would vanish.

An axis so drawn is in the plane of the meridian, and points, as we know, to the pole,—its elevation being equal to the latitude of the place.

The diurnal motion of the stars is strictly uniform, and so would that of the sun be if the daily retardation of about 4 minutes, spoken of above, were always the same. But this is constantly altering, so that the time, as measured by the sun's motion, and also consequently as measured by a sun dial, does not move on at a strictly uniform pace. This irregularity, which is slight, would be of little consequence in the ordinary affairs of life, but clocks and watches being mechanical measures of time could not, except by extreme complication, be made to follow this irregularity, even if desirable, which is not the case.

The clock is constructed to mark uniform time in such wise that the length of the clock day shall be the average of all the solar days in the year. Four times a year the clock and the sun-dial agree exactly; but the sun-dial, now going a little slower, now a little faster, will be sometimes behind, sometimes before the clock—the greatest accumulated difference being about 16 minutes for a few days in November, but on the average much less. The four days on which the two agree are April 15, June 15, September 1, and December 24.

Clock-time is called mean time, that marked by the sun-dial is called apparent time, and the difference between them is the *equation of time*. It is given in most calendars and almanacs, frequently under the heading "clock slow," "clock fast." When the time by the sun-dial is known, the equation of time will at once enable us to obtain the corresponding clock time, or vice versa.

Atmospheric refraction introduces another error, by altering the apparent position of the sun; but the effect is too small to need consideration in the construction of an instrument which, with the best workmanship, does not after all admit of very great accuracy.

The general principles of dialling will now be readily understood. The problem before us is the following:—

A rod, or *style*, as it is called, being firmly fixed in a direction parallel to the earth's axis, we have to find how and where points or lines of reference must be traced on some fixed surface behind the style, so that when the shadow of the style falls on a certain one of these lines we may know that at that moment it is solar noon,—that is, that the plane through the style and through the sun then coincides with the meridian; again, that when the shadow reaches the next line of reference, it is 1 o'clock by solar time, or, which comes to the same thing, that the above plane through the style and through the sun has just turned through the twenty-fourth part of a complete revolution; and so on for the subsequent hours,—the hours before noon being indicated in a similar manner. The *style* and the surface on which these lines are traced together constitute the dial.

The position of an intended sun-dial having been selected,—whether on church tower, south front of farm-stead, or garden wall—the surface must be prepared, if necessary, to receive the hour-lines.

The chief, and in fact the only practical difficulty will be the accurate fixing of the style, for on its accuracy the value of the instrument depends.

It must be in the meridian plane, and must make an angle with the horizon equal to the latitude of the place. The latter condition will offer no difficulty, but the exact determination of the meridian plane which passes through the point where the style is fixed to the surface is not so simple. We shall, further on, show how this may be done; and in the meantime, we shall assume that we have found the true position, and have firmly fixed the style to the dial and secured it there by cross wires, or by other means.

The style itself will be usually a strong metal wire whose thickness may vary with circumstances, and when we speak of the shadow cast by the style it must always be understood that the middle line of the thin band of shade is meant.

The point where the style meets the dial is called the centre of the dial: it is the centre from which all the hour-lines radiate.

The position of the XII o'clock line is the most important to determine accurately, since all the others are usually made to depend on this one. We cannot trace it correctly.
on the dial until the style has been itself accurately fixed in its proper place, as will be explained hereafter. When that is done the XII o'clock line will be found by the intersec-
tion of the dial surface with the vertical plane which
contains the style, and the most simple way of drawing
it on the dial will be by suspending a plummet from some
point of the style whence it may hang freely, and wait-
ing until the shadows of both style and plummet coincide
on the dial. This single shadow will be the XII o'clock line.

In one class of dials, namely, all the vertical ones, the
XII o'clock line is simply the vertical line from the centre;
it can, therefore, at once be traced on the dial face by
using a fine plummet line.

The XII o'clock line being traced, the easiest and most
accurate method of tracing the other hour lines would at
the present day when good watches are common, be by
marking where the shadow of the style falls when 1, 2, 3,
&c., hours have elapsed since noon, and the next morning
by the same means the forenoon hour lines could be traced,
and in the same manner the hours might be subdivided
into halves and quarters, or even into minutes.

But formerly, when watches were not, the tracing of
the I, II, III, &c., o'clock lines was done by calculating the
angle which each of these lines would make with the XII
o'clock line. Now, except in the simple cases of a
horizontal dial or of a vertical dial facing a cardinal point,
thus would require long and intricate calculations, or elabor-
ated geometrical constructions, implying considerable mathe-
matical knowledge, but also introducing increased chances
of error. The chief source of error would be in the uncer-
tainty of the data, for the position of the dial-plane
would have to be found before the calculations began,—
that is, it would be necessary to know exactly by how
many degrees it declined from the south towards the east
or west, and by how many degrees it inclined from the
vertical. The amounts, with the means at their disposal,
could obtain these results only very roughly.

Dials received different names according to their posi-
tion —

**Horizontal dials, when traced on a horizontal plane.**

**Vertical dials, when on a vertical plane facing one of the
cardinal points.**

**Vertical declining dials, on a vertical plane not facing a
cardinal point.**

**Inclining dials,** when traced on planes neither vertical nor horizontal (those were further distinguished as recti-
lining when leaning backwards from an observer, proclining when leaning forwards).

**Equatorial dials,** when the plane is at right angles to
the earth's axis, &c.

We shall limit ourselves to an investigation of the sim-
pliest and most usual of these cases, referring the reader
for further details, to the latter works given at the end of
this article.

**Dual Construction** — A very correct view of the problem of
dual construction may be obtained as follows —

Conceive a transparent cylinder (fig 1) having an axis AB
parallel to the axis of the earth. On the surface of the cylinder
let equidistant generating lines be traced 15° apart, one of
them XII XII being in the meridian plane through AB, and
the others I, II, III, &c., following in the order of the sun's
motion.

Then the shadow of the line AB will obviously fall on the line
XII XII at apparent noon, on the line I at one hour after noon,
on II at two hours after noon, and so on. If now the cylinder
be cut by any plane MN representing the plane on which
the shadow of AB will be intercepted by the line XI XII,
and fall on the lines AXI, AI, AII, &c.

The construction of the dual consists in determining the angles
made by AI, AII, &c with AXI; the line AXI itself, being
in the vertical plane through AB, may be supposed known.

For the purposes of actual calculation, perhaps a trans-
parent sphere will, with advantage, replace the cylinder,
and we shall here apply it to calculate the angles made
by the hour line with the XII o'clock line in the two cases
of a horizontal dial and of a vertical south dial.

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**Fig. 1.**

**Horizontal Dial** — Let PEP (fig 2), the axis of the supposed
transparent sphere, be directed towards the north and south
poles of the heavens. Draw the two great circles, HMA, QMA,
the former of which, the other perpendicular to the axis PEP,
and therefore coinciding with the plane of the equator. Let
EA be vertical, then the circle QEP will be the meridian, and
by its intersection A with the horizontal will determine the XII
o'clock line EA. Next divide the equatorial circle QMA into 24
equal parts a, b, c, &c. of 15° each, beginning from the
meridian PA, and through the various points of division and the
poles draw the great circles Ppa, Ppb, &c. These will exactly
correspond to the equidistant generating lines on the cylinder
in the previous construction, and the shadow of the style will
fall on these circles after successive intervals of 1, 2, 3, &c.
hours from noon. If they meet the horizontal in the points B, C, D,
&c., then EB, EC, ED, &c. will be the I, II, III, &c., hour
lines required, and the problem of the horizontal dial consists
in calculating the angles which these lines make with the XII o'clock
line EA, whose position is known. The spherical triangles PAB,
PAC, &c., enable us to do this readily. They are all right-angled
at A, the angle PAB in the latitude of the plane, and the angles
APB, APC, &c, are respectively 15°, 30°, &c.

\[
\tan \text{AB} = \tan 15° \sin \text{latitude,} \\
\tan \text{AC} = \tan 30° \sin \text{latitude,}
\]

These determine the sides AB, AC, &c. that is, the angles AEB,
AFC, &c., required.

For examples, let us find the angles made by the XII o'clock line at
the following places — Madras, London, Edinburgh, and Hammer-
fest (Norway).

---
In the first place the metal plate from London, which is often more convenient to use than a wire style, the plate may be used. At noon, it will change its cast a shadow. Thus the eastern edge will give the shadow for all hours before 6 o'clock in the morning. From 6 o'clock until noon the western edge will give the shadow for all hours after 6 o'clock, and sets a minute to the day.
the meridian plane will be the vertical plane of 15°, and the horizontal line EM will be the 0 o'clock line. Now, as in the previous problem, divide the equatorial circle into 24 equal arcs of 15° each, beginning at a point, viz., AB, AC, &c., each quadrant EM, MQ, &c., containing the arc, then through each point of division draw the vertical plane of 15° each, and through the axis PP draw a plane cutting the sphere in 24 equal great circles. As the sun revolves round the axis the shadow of the axis will successively fall on these circles at intervals of one hour, and if these circles cross the equatorial plane EM the points A, B, C, &c., the shadow of the lower portion EP of the axis will fall on the lines RA, RB, EC, &c., which will therefore be the required hour-lines on the vertical dial, EP being the style.

There is no necessity for going beyond the 45° clock hour-line on each side of noon; for, in the winter months the sun sets earlier than 6 o'clock, and in the summer months it passes behind the plane of the dial before that time, and is no longer available.

It remains to show how the angles AEB, AEC, &c., may be calculated.

The spherical triangles PAB, PAC, &c., will give us a simple rule. These triangles are all right-angled at A, the side PA, equal to 27°, is the co-latitude of the place, that is, the difference between the latitude and 90°, and the successive angles APB, APC, &c., are 15°, 30°, 45°, &c., respectively. Then

\[ \tan AB = \tan 15° \cos \text{latitude}, \]

\[ \tan AC = \tan 45° \cos \text{latitude}, \]

and the arcs AB, AC so found are the measure of the angles AEB, AEC, &c., required.

We shall, as examples, calculate the 15° o'clock hour angle AEB for each of the four places we have already taken in the horizontal dial.

<table>
<thead>
<tr>
<th>Latitude (13° 30' N lat.)</th>
<th>London (51° 30' N lat.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log tan. 15°...</td>
<td>9 42905</td>
</tr>
<tr>
<td>Log cos 13° 30'...</td>
<td>9 98396</td>
</tr>
<tr>
<td>Log cot. 15°...</td>
<td>9 42905</td>
</tr>
<tr>
<td>Log cos. 15° 30'...</td>
<td>9 79415</td>
</tr>
<tr>
<td>Log cot. 27°...</td>
<td>9 42905</td>
</tr>
<tr>
<td>Log cos. 27° 30'...</td>
<td>9 79415</td>
</tr>
<tr>
<td>Log cot. 45°...</td>
<td>9 42905</td>
</tr>
<tr>
<td>Log cos. 45° 30'...</td>
<td>9 79415</td>
</tr>
<tr>
<td>Log cot. 63°...</td>
<td>9 42905</td>
</tr>
<tr>
<td>Log cos. 63° 30'...</td>
<td>9 79415</td>
</tr>
<tr>
<td>Log cot. 81°...</td>
<td>9 42905</td>
</tr>
<tr>
<td>Log cos. 81° 30'...</td>
<td>9 79415</td>
</tr>
</tbody>
</table>

In this case the angles diminish as the latitudes increase, the opposite result to that of the horizontal dial.

Inclining, Reducing, &c. Dials.—We shall not enter into the calculation of these cases. Our imaginary sphere being, as before supposed, constructed with its centre at the centre of the dial, and all the hour-circles traced upon it, the intersection of these hour-circles with the plane of the dial will determine the hour-lines just as in the previous cases, but the triangles will no longer be right-angled, and the simplicity of the calculation will be lost, the chances of error being greatly increased by the difficulty of drawing the dial-plane in its true position on the sphere, since that true position will have to be found from observations which can be only roughly performed.

In all these cases, and in cases where the dial surface is not a plane, and the hour-lines, consequently, are not straight lines, the only safe practical way is to mark rapidly on the dial a few points (one is sufficient when the dial face is plane) of the shadow at the moment when a good clock shows that the hour has arrived, and afterwards connect these points with the centre by a continuous line. Of course the style must have been accurately fixed in its true position before we begin.

Equatorial Dial.—The name equatorial dial is given to one whose plane is at right angles to the style, and therefore parallel to the equator. It is the simplest of all dials. A circle (fig. 5) divided into 24 equal arcs is placed at right angles to the style, and hour divisions are marked upon it. Then if care be taken that the style point accurately to the pole, and that the noon position coincides with the meridian plane, the shadow of the style will fall on the other divisions, each at its proper time. The divisions must be marked on both sides of the dial, because the sun will shine on opposite sides of the summer and in the winter months, changing at each equinox.

To find the Meridian Plane.—We have, so far, assumed the meridian plane to be accurately known; we shall proceed to describe some of the methods by which it may be found.

The mariner’s compass may be employed as a first rough approximation. It is well known that the needle of the compass, when free to move horizontally, oscillates upon its pivot and settles in a direction termed the magnetic meridian. This does not coincide with the true north and south line, but the difference between them is generally known with tolerable accuracy, and is called the variation of the compass. The variation differs widely at different parts of the surface of the earth, being now about 20° W in London, 7° W in New York, and 17° E in San Francisco. Now the variation at any place stationary, though the change is slow. We said that the variation in London is about 20° W, in 1837 it was about 24° W, and there is even a small daily oscillation which takes place about the mean position, but too small to need notice here.

With all these elements of uncertainty, it is obvious that the compass can only give a rough approximation to the position of the meridian, but it will serve to fix the style so that only a small further alteration will be necessary when a more perfect determination has been made.

A very simple practical method is the following:

Place a table (fig. 6), or other plane surface, in such a position that it may receive the sun’s rays both in the morning and in the afternoon. Then carefully level the surface by means of a spirit-level. This must be done very accurately, and the table in that position made perfectly secure, so that there be no danger of its shifting during the day.

Next, suspend a plummet SH from a point S, which must be rigidly fixed. The extremity H, where the plummet just meets the surface, should be somewhere near the
middle of one end of the table. With H as centre, describe any number of concentric arcs of circles, AB, CD, EF, &c.

A bead P, kept in its place by friction, is threaded on the plummet line at some convenient height above H.

Every thing being thus prepared, let us follow the shadow of the bead P as it moves along the surface of the table during the day. It will be found to describe a curve ACE . . . , FDB, approaching the point H as the sun advances towards noon, and receding from it afterwards. (The curve is a conic section—an hyperbola in these regions.) At the moment when it crosses the arc AB, mark the point A; AP is then the direction of the sun, and, as AH is horizontal, the angle PAH is the altitude of the sun. In the afternoon mark the point B where it crosses the same arc; then the angle PBH is the altitude. But the right-angled triangles FHA, FHB are obviously equal; and the sun has therefore the same altitudes at those two instants, the one before, the other after noon. It follows that, if the sun has not changed its declination during the interval, the two positions will be symmetrically placed one on each side of the meridian. Therefore, drawing the chord AB, and bisecting it in M, HM will be the meridian line.

Each of the other concentric arcs, CD, EF, &c., will furnish its meridian line. Of course these should all coincide, but if not, the mean of the positions thus found must be taken.

The proviso mentioned above, that the sun has not changed its declination, is scarcely ever realized; but the change is slight, and may be neglected, except perhaps about the time of the equinoxes, at the end of March and at the end of September. Throughout the remainder of the year the change of declination is so slow that we may safely neglect it. The most favourable times are at the end of June and at the end of December, when the sun's declination is almost stationary. If the line HM be produced both ways to the edges of the table, then the two points on the ground vertically below those on the edges may be found by a plummet, and, if permanent marks be made there, the meridian plane, which is the vertical plane passing through these two points, will have its position perfectly secured.

To place the Style of a Dial in its True Position. — Before giving any other method of finding the meridian plane, we shall complete the construction of the dial, by showing how the style may now be accurately placed in its true position. The angle which the style makes with a hanging plummet, being the colatitude of the place, is known, and the north and south direction is also roughly given by the mariner's compass. The style may therefore be already adjusted approximately—correctly, indeed, as to its inclination—but probably requiring a little horizontal motion east or west. Suspend a fine plummet-line from some point of the style, then the style will be properly adjusted if, at the very instant of noon, its shadow falls exactly on the plummet-line,—or, which is the same thing, if both shadows coincide on the dial.

This instant of noon will be given very simply by the meridian plane, whose position we have secured by the two permanent marks on the ground. Stretch a cord from the one mark to the other. This will not generally be horizontal, but the cord will be wholly in the meridian plane, and that is the only necessary condition. Next, suspend a plummet over the mark which is nearer to the sun, and, when the shadow of the plummet-line falls on the stretched cord, it is noon. A signal from the observer there to the observer at the dial enables the latter to adjust the style as directed above.

Other Methods of finding the Meridian Plane. — We have dwelt at some length on these practical operations because they are simple and tolerably accurate, and because they want neither watch, nor sextant, nor telescope—nothing more, in fact, than the careful observation of shadow lines.

The polar star may also be employed for finding the meridian plane without other apparatus than plummet-lines. This star is now only about 1° 21' from the pole; if therefore a plummet-line be suspended at a few feet from the observer, and if he shift his position till the star is exactly hidden by the line, then the plane through his eye and the plummet-line will never be far from the meridian plane. Twice in the course of the 24 hours the planes would be strictly coincident. This would be when the star crosses the meridian above the pole, and again when it crosses it below. If we wished to employ the method of determining the meridian, the times of the stars crossing would have to be calculated from the data in the Almanac, and a watch would be necessary to know when the instant arrived. The watch need not, however, be very accurate, because the motion of the star is so slow that an error of ten minutes in the time would not give an error of one eight of a degree in the azimuth.

The following accidental circumstance enables us to dispense with both calculation and watch. The right ascension of the star η Ursae Majoris, that star in the tail of the Great Bear which is farthest from the "poles," happens to differ by a little more than 12 hours from the right ascension of the polar star. The great circle which joins the two stars passes therefore close to the pole. When the polar star, at a distance of about 11° from the pole, is crossing the meridian above the pole, the star η Ursae Majoris, whose polar distance is about 40°, has not yet reached the meridian below the pole.

When η Ursae Majoris reaches the meridian, which will be within half an hour later, the polar star will have left the meridian; but its slow motion will have carried it only a very little distance away. Now at some instant between these two times—much nearer the latter than the former—the great circle joining the two stars will be exactly vertical, and at this instant, which the observer determines by seeing that the plummet-line hides the two stars simultaneously, neither of the stars is strictly in the meridian; but the deviation from it is so small that it may be neglected, and the plane through the eye and the plummet-line taken for meridian plane.

In all these cases it will be convenient, instead of fixing the plane by means of the eye and one fixed plummet, to suspend a second plummet at a short distance in front of the eye; this second plummet, being suspended so as to allow of lateral shifting, must be moved so as always to be
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between the eye and the fixed plummet. The meridian plane will be secured by placing two permanent marks on the ground, one under each plummet.

This method, by means of the two stars, is only available for the upper transit of Polaris; for, at the lower transit, the other star {Ursa Major} would pass close to or beyond the zenith, and the observation could not be made. Also the star will not be visible when the upper transit takes place in the day-time, so that one-half of the year is lost to this method.

Neither could it be employed in lower latitudes than 40° N., for there the star would be below the horizon at its lower transit,—we may even say not lower than 45° N., for the star must be at least 5° above the horizon before it becomes distinctly visible.

There are other pairs of stars which could be similarly employed, but none so convenient as these two, on account of Polaris with its very slow motion being one of the pair.

To place the Style in its True Position without previous determination of the Meridian Plane.—The various methods given above for finding the meridian plane have for ultimate object the determination of the plane, not on its own account, but as an element for fixing the instant of noon, whereby the style may be properly placed.

We shall dispense, therefore, with all this preliminary work if we determine noon by astronomical observation. For this we shall want a good watch, or pocket chronometer, and a sextant or other instrument for taking altitudes. The local time at any moment may be determined in a variety of ways by observation of the celestial bodies. The simplest and most practically useful methods will be found described and investigated in any good educational work on astronomy.

For our present purpose a single altitude of the sun taken in the forenoon will be most suitable. At some time in the morning, when the sun is high enough to be free from the mists and uncertain refractions of the horizon—but to insure accuracy, while the rate of increase of the altitude is still tolerably rapid, and, therefore, not later than 10 o'clock—take an altitude of the sun, an assistant, at the same moment, marking the time shown by the watch. The altitude so observed being properly corrected for refraction, parallax, \&c., will, together with the latitude of the place, and the sun's declination, taken from the Nautical Almanac, enable us to calculate the time. Thus will be the solar or apparent time, that is, the very time we require; and we must carefully abstain from applying any equation of time. Comparing the time so found with the time shown by the watch, we see at once by how much the watch is fast or slow of solar time; we know, therefore, exactly what time the watch must mark when solar noon arrives, and waiting for that instant we can fix the style in its proper position as explained before.

We can dispense with the sextant and with all calculation and observation if, by means of the pocket chronometer, we bring the time from some observatory where the work is done; and, allowing for the change of longitude, and also for the equation of time, if the time we have brought is clock time, we shall have the exact instant of solar noon as in the previous case.

In remote country districts a dial will always be of use to check and even to correct the village clock; and the description and directions here given will, we think, enable any ingenious artisan to construct one.

In former times the fancy of dialists seems to have run riot in devising elaborate surfaces on which the dial was to be traced. Sometimes the shadow was received on a cone, sometimes on a cylinder, or on a sphere, or on a combination of these. A universal dial was constructed of a figure in the shape of a cross, another universal dial showed the hours by a globe and by several gnomons. These universal dials required adjusting before use, and for this a mariner's compass and a spirit-level were necessary. It would be tedious and useless to enumerate the various forms designed, and, as a rule, the more complex the less accurate.

Another class of useless dials consisted of those with variable centres. They were drawn on fixed horizontal planes, and each day the style had to be shifted to a new position. Instead of hour-times they had hour-points, and the style, instead of being parallel to the axis of the earth, might make any chosen angle with the horizon. There was no practical advantage in their use, but rather the reverse, and they can only be considered as furnishing material for new mathematical problems.

Portable Dials.—The dials so far described have been fixed dials, for even the fanciful ones to which reference was just now made were to be fixed before using. There were, however, other dials, made generally of a small size, so as to be carried in the pocket, and these, so long as the sun shone, roughly answered the purpose of a watch.

The description of the portable dial has generally been mixed up with that of the fixed dial, as if it had been merely a special case, and the same principle had been the basis of both, whereas there are essential points of difference between them, besides those which are at once apparent.

In the fixed dial the result depends on the uniform angular motion of the sun round the fixed style, and a small error in the assumed position of the sun, whether due to the imperfection of the instrument, or to some small neglected correction, has only a trailing effect on the time. This is owing to the angular displacement of the sun being so rapid—a quarter of a degree every minute—that for the ordinary affairs of life greater accuracy is not required, as a displacement of a quarter of a degree, or at any rate of one degree, can be readily seen by nearly every person. But with a portable dial this is no longer the case. The uniform angular motion of the sun is not now available, because we have no determined fixed plane to which we may refer it. In the new position, to which the observer has gone, the zenith is the only point of the heavens he can at once practically find, and the basis for the determination of the time is the constantly but very irregularly varying zenith distance of the sun.

At sea the observation of the altitude of a celestial body is the only method available for finding local time, but the perfection attained in the construction of the portable dial of the sextant (dulyly by the introduction of telescopes) enables the sailor to reckon on an accuracy of seconds instead of minutes. Certain precautions should, however, to be taken. The observations must not be made within one or two hours of noon, on account of the slow rate of change at that time, nor too near the horizon, on account of the uncertain refractions there, and the same restrictions must be observed in using a portable dial.

To compare roughly the value (as to accuracy) of the fixed and the portable dials, let us take a mean position in Great Britain, say 54° lat., and a mean declination when the sun is in the equator. It will rise at 6 o'clock, and at noon have an altitude of 36°,—that is, the portable dial will indicate an average change of one-tenth of a degree in each minute, or two and half times slower than the fixed dial. The vertical motion of the sun increases, however, nearer the horizon, but even there it will be only one-eighth of a degree each minute, or half the rate of the fixed dial, which goes on at nearly the same speed throughout the day.

Portable dials are also much more restricted in the range of latitude for which they are available, and they should
not be used more than 4 or 5 miles north or south of the
place for which they were constructed.

We shall briefly describe two portable dials which were
in actual use.

* Dial on a Cylinder.*—A hollow cylinder of metal (fig. 7),
4 or 5 inches high, and about an inch in diameter, has a lid
which admits of toler­ably easy rotation. A
hole in the lid receives
the style, shaped some­what like a bayonet;
and the straight part of
the style, which, on
account of the two
bends, is lower than
the lid, projects hor­izontally out from
the cylinder to a distance of
1 or 1 ½ inches.

When not in use the
style would be taken
out and placed inside
the cylinder.

A horizontal circle
is traced on the cylin­der opposite the pro­jecting style, and this
circle is divided into
56 approximately equi­distant intervals. These intervals represent spaces of time,
and to each division is assigned a date, so that each month
has three dates marked as follows:—January 10, 20, 31; February 10, 20, 28; March 10, 20, 31; April 10, 20, 30,
and so on,—always the 10th, the 20th, and the last day
of each month.

Through each point of division a vertical line parallel to
the axis of the cylinder is drawn from top to bottom. Now
it will be readily understood that if, upon one of these
days, the lid be turned so as to bring the style exactly
opposite the date, and if the style be then placed on a
horizontal table so as to receive sun-light, and turned round
bodily until the shadow of the style falls exactly on the
vertical line below it, the shadow will terminate at some
definite point of this line, the position of which point will
depend on the length of the style—that is, the distance of
its end from the surface of the cylinder—and on the altitude
of the sun at that instant. Suppose that the observations
are continued all day, the cylinder being very gradually
turned so that the style may always face the sun, and
suppose that marks are made on the vertical line to show
the extremity of the shadow at each exact hour from
sunrise to sunset—these times being taken from a good
fixed sun dial,—then it is obvious that the next year, on
the same date, the sun’s declination being about the same,
and the observer in about the same latitude, the marks
made the previous year will serve to tell the time all that
day.

What we have said above was merely to make the
principle of the instrument clear, for it is evident that this
mode of marking, which would require a whole year’s
sunshine and hourly observation, cannot be the method
employed.

The positions of the marks are, in fact, obtained by
calculation. Corresponding to a given date, the declination
of the sun is taken from the almanac, and this, together
with the latitude of the place and the length of the style,
will constitute the necessary data for computing the length
of the shadow, that is, the distance of the mark below the
style for each successive hour.

We have assumed above that the declination of the sun
is the same at the same date in different years. This is
not quite correct, but, if the dates be taken for the second
year after leap year, the results will be sufficiently approxi­mate.
The actual calculations will offer no difficulty.

When all the hour marks have been placed opposite to
their respective dates, then a continuous curve, joining the
corresponding hour-points, will serve to find the time for a
day intermediate to those set down, the lid being turned
till the style occupy a proper position between the two
divisions. The horizontality of the surface on which the
instrument rests is a very necessary condition, especially in
summer, when, the shadow of the style being long, the
extreme end will shift rapidly for a small deviation from the
vertical, and render the reading uncertain. The dial
can also be used by holding it up by a small ring in the
top of the lid, and probably the verticality is better
ensured in that way.

* Portable Dial on a Card.*—This neat and very ingen­ious
dial is attributed by Ozanam to a Jesuit Father, De Saint
Regaud, and probably dates from the early part of the 17th
century. Ozanam says that it was sometimes called the
capsicum, from some fancied resemblance to a cowl thrown
back.

**Construction.**—Draw a straight line ACB parallel to the top
of the card (fig. 8) and another DCE at right angles to it; with C as

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1 Strict equality is not necessary, as the observations made are on
the vertical through each division-point, without reference to the
others. It is not even requisite that the divisions should go completely
and exactly round the cylinder, although they were always so drawn,
and both these conditions were insisted upon in the directions for the
construction.
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its; by subdivision of the small arcs $\Delta \psi$, $\psi$, $\eta$, $\chi$, we may draw the hour lines corresponding to hours and quarters, but that only where it can be done without confusion.

Draw ASD making $AC$ an angle equal to the latitude of the place, and let it meet BS in D, through which point draw FGD at right angles to AD.

With centre A, and any convenient radius AS, describe an arc of circle BST, and graduate the arc by marking degrees or seconds on it, from 0° to 90° or 27° respectively on each side at B and T. Next determine the points on the straight line FGD where rain drawn from A to the degrees or seconds on the arc would cross it, and carefully mark these crossing.

The divisions of BST are to correspond to the sun's declination, south declinations on BS and north declinations on SP. In the other hemisphere of the earth this would be reversed, the north declinations would be on the upper half.

Now, taking a second year after leap year (because the declinations of that year are about the mean of each set of four years), find the days of the month when the sun has these different declinations, and place these dates, or as many of them as can be shown without confusion, opposite the corresponding marks on FGD. Draw the line of the card parallel to the line AOB, and, near the extremity, to the right, draw any small figure intended to form, as it were, a door of which a handle could be drawn exactly at right angles to the sun-line. Make a fine open slit $s$ right through the card and extending from the handle to a short distance on the door, the centre line of this slit coinciding accurately with the sun-line. Now, cut the door completely through the card, except, of course, along the handle, which, when the card is thick, should be partly cut through at the back, to facilitate the opening. Cut the card right through along the line FGD, and pass a thread carrying a little plummet W and a very small bead F, the bead having sufficient friction with the thread to retain any position when acted on only by its own weight, but sliding easily along the thread when moved by the hand. At the back of the card the thread terminates in a knot to hinder it from being drawn through, or better, because giving some friction and a better hold, it passes through the centre of a small disk of wood—a fraction of an inch in diameter—and, by a knot, is made fast at the back of the disc.

To complete the construction, with the centres F and G, and radii FA and GA, draw the two arcs AF and AG which will limit the hour lines, for in an observation the bead will always be found between them. The forenoon and afternoon hours may then be marked as indicated in the figure. The dial does not of itself discriminate between the forenoon and afternoon, but extraneous circumstances, as, for instance, whether the sun is rising or setting, will settle that point, except when close to noon, when it will always be uncertain.

To rectify the dial (using the old expression, which means to prepare the dial for an observation) open the small door, by turning it about its hinge, till it stands well out in front. Next set the thread in the line PG opposite the door of the month, and stretch it over the card P, while the bead PG along till it exactly coincides with $A$.

To find the hour of the day, hold the dial in a vertical position in such a way that its plane may pass through the sun. The verticality is ensured by seeing that the bead rests against the card without pressing. Now gradually tilt the dial (without altering its vertical plane), until the central line of sunshine, passing through the open slit of the door, just falls along the sun-line. The hour line against which the bead P then rests indicates the hour.

The sun-line drawn above has always, so far as we know, been used as a shadow-line. The upper edge of the rectangular door was the prolongation of the line, and, the door being opened, the dial was gradually tilted until the shadow cast by the upper edge exactly coincided with it, but this shadow tilts the card one-quarter of a degree more than the sun-line, because it is given by that portion of the sun which just above appears on the edge, that is, by the upper limb of the sun, which is one-quarter of a degree higher than the center. Now, even at some distance from noon, the sun will sometimes take a considerable time to rise one-quarter of a degree, and by so much time will the indication of the dial be in error.

The central line of light which comes through the open slit will be free from this error, because it is given by light from the center of the sun.

The card-dial deserves to be looked upon as something more than a mere toy. Its ingenuity and scientific accuracy give it an educational value which is not to be measured by the roughness of the results obtained, and the following demonstration of its correctness will, it is hoped, be useful for what we have to say on that subject.

**Demonstration.**—Let $H$ (fig. 9) be the point of suspension of the plummet at the time of observation, so that the angle $H_2$ is the true declination of the sun, $H$ the bead, resting against the hour-line $XY$. Join $CX$, then the angle $ACX$ is the hour angle $X$ from noon given by the bead, and we have to prove that the hour-angle is the correct one corresponding to a north latitude $DAC$, a north declination $AD$ and an altitude equal to the angle which the sun-line, or its parallel $AC$, makes with the horizontal. The angle $FHQ$ will be equal to the altitude, if $HQ$ be drawn parallel to $DC$, for the pair of lines $HQ$, $HF$ will be respectively at right angles to the sun-line and the horizontal.

Draw $PQ$ and $HM$ parallel to $AC$, and let them meet $DE$ in $M$ and $N$ respectively.

Let $HF$ and its equal $HA$ be represented by $x$. Then the following values will be readily deduced from the figure:

\[ \begin{align*}
AD &= \cos \delta, \\
DH &= \tan \delta, \\
CQ &= \sin \delta \\
FQ &= \cos \delta + \sin \delta \\
PC &= \cos \delta, \\
HQ &= \sin \delta \\
NC &= \sin \delta \\
NC &= \tan \delta.
\end{align*} \]

Now, since $HQ = FQ + FN$, $\cos \delta = \cos \delta + \sin \delta$, we have, by simple substitution,

\[ \begin{align*}
\sin \delta &= \sin \delta + \sin \delta \\
\cos \delta &= \cos \delta + \cos \delta \\
\tan \delta &= \tan \delta + \tan \delta
\end{align*} \]

At which equation determines the hour angle $ACX$ shown by the bead.

To determine the hour angle of the sun at the same moment, let

**Fig. 10.**

Fig. 10 represents the celestial sphere, $HR$ the horizon, $P$ the pole, and $Z$ the zenith, and $S$ the sun.

**VII.** — 21
DIAMANTE. The Italian fresco painter, commonly known as Fra Diamante, was born at Prato about 1400. He was a Carmelite friar, a member of the Florentine community of that order, and was the principal assistant of the more celebrated Filippo Lippi. The Carmelitine convent of Prato, which he adorned with many works in fresco, has been suppressed, and the buildings have been altered to a degree involving the destruction of the paintings. He was the principal assistant of Filippo Lippi in the grand frescoes which may still be seen at the east end of the cathedral of Prato. In the midst of the work he was recalled to Florence by his conventual superior, and a minute of proceedings of the commune of Prato is still extant, in which it is determinated to petition the metropolitan of Florence to obtain his return to Prato,—a proof that his share in the work was so important that the suspension of it. Subsequently he assisted Filippo in the execution of the frescoes still to be seen in the cathedral of Spoleto, which Fra Diamante completed in 1470 after his master's death in 1469. Fra Diamante left a son ten years old to the care of Diamante, who, having received 200 ducats from the commune of Spoleto, as the balance due for the work done in the cathedral, returned with the child to Florence, and, as Vasari says, bought land for himself with the money, giving but a small portion to the child. The accusation of wrong-doing, however, would depend upon the share of the work executed by Fra Diamante, and the terms of his agreement with Filippo. Fra Diamante must have been nearly seventy when he completed the frescoes at Spoleto, but the exact year of his death is not known.

See Relazione della Pittura di Fra Filippo nel coro di Prato, by the Canon Baldizzi, Prato, also the last edition of Vasari, Florence, 1849.

DIAMANTINA, formerly Tajuco, a town of Brazil, in the province of Minas-Geraes, is situated at an altitude of 5700 feet above sea-level, in a valley watered by affluents of the Jequitinhonha. Its streets are broad, and the houses are mostly of wood. The public structures include several churches, barracks, three hospitals, and a school. The surrounding district is sterile, but is rich in minerals. The discovery of diamonds there was made in 1729. Population about 7000, or, with that of the neighbouring villages, 15,000. See Brazil, vol. iv. p. 224.

DIAMANTINO, a town of Brazil, in the province of Matto-Grosso, is situated close to the Diamantino river, about 40 miles from its junction with the Paraguay, at the foot of a high range of country, in 14° 24' 43" S. lat. and 56° 8' 30" W. long. The neighbourhood, which is infertile, yields diamonds and gold. Population about 5000.

DIAMOND. This gem, the most highly valued and history brilliant of precious stones, is also remarkable for its hardness and its peculiar physical and chemical properties. Though not always accurately distinguished from similar stones, it seems to have attracted notice at a very early period, especially in India, the chief source of supply in ancient times. The old Jewish doctors regarded the jahalom, the third in the second row of stones in the breast-plate of the high priest (Exod. xxxix. 11), as the diamond, and it is thus translated in the English and other versions. But as each stone bore the name of one of the tribes, and there is no reason to believe that any method of polising such hard stones, still less of engraving letters on them, was then known, the identification cannot be accurate. Among the Greeks it is first mentioned about three centuries B.C. under the name of adamant (ἀδαμάντος), "the unsatable," referring to its hardness and power of resisting fire. The same name was previously given to a metal highly valued from its extreme hardness for armour and weapons, and the twofold use of the term continued long both in Greek and Latin. The name of the gem in our own and most modern languages is derived from this old name, occurring in the form diaam in Albertus Magnus and other authors of the 13th century. Curiously enough, the French aimant, applied to the magnet, comes from the same term in its other signification of an ore or metal.

The fullest account of the adamas as a stone is found in Pliny, who says it exceeds in value all human things, and that its use was confined to kings, and to few even of them. He mentions six varieties, the most remarkable being the Indian and Arabian, of such unspeakable hardness that when struck with a hammer even the iron and anvil were torn asunder—"its quiescentes ictonum, ut ferrum utrinque dissolutum, incudisque etiam ipsi dissiliunt." It also resisted the fire, and could only be subdued and broken down when dipped in fresh warm goat's blood. Similar fables continued to prevail during the Middle Ages, and even yet have hardly vanished from popular belief. As an ornamental stone it was highly esteemed during the early times of the Roman empire, as some scandalous stories recorded by Juvenal testify, though only stones of naturally polished faces could be used. This fact is proved not only by the words of Seneca—"nee securi adamas suet cadet vel deterii potest"—and others, but from specimens of diamonds set in gold, with no artificial polishing, which have come down both from classic times and from the Middle Ages. This unworkable character long limited both its use value; and the more highly coloured rubies, and even emeralds and sapphires, were often preferred to it. It was only after Ludwig van Berghen (or Berghem, as he is often named) in 1476 discovered the mode of cutting and polab-
D I A M O N D

ing it, that the diamond slowly regained the first place among gems. Even in the 16th century (1550), Benvenuto Cellini (Trattato dell' orficerio, cap 1) assigns it only the third rank in value, estimating a perfect ruby of one carat weight as worth 800 scudi d'oro (each equal to about 4 shillings), a similar emerald at 400, an equal diamond at 100, and a sapphire at 10 scudi. In the same century the use of the diamond for cutting glass and engraving gems seems also to have become known.

The diamond always occurs in crystals of the tesselated or cubical system. Its most frequent forms are the octahedron, or double four-sided pyramid (Fig. 1), the rhombic dodecahedron with twelve faces (Fig. 2), and others with twenty-four (Fig. 3), and forty-eight faces (Fig. 4). The first form is most common in stones from India, the second in those from Brazil. Cubes also occur, but are rare, whilst the icossitetrahedron has not been observed. Hitherto the diamond has been described as hemihedral, but Sadebeck from his own and G. Rose's researches shows it to be holohedral (in the Berlin Monatssberichte, Oct. 1876). The faces are often curved, strongly striated, or marked by stair-like inequalities, hiding the true form. Many of the crystals also are round almost like spheres (Fig. 5), or the smaller ones like grains of sand. This does not arise, however, from attrition during transport by water, but is the original shape of the stones. Molecules, or twin-crystals, specially of two octahedrons, are common, and the striae due to this structure appear even on the polished facets. The diamond has a perfect cleavage parallel to the faces of the octahedron, and breaks readily both in this and other directions. Contrary to the old and still common opinion, it is neither brittle, and is easily injured by a slight blow or fall. Its hardness—10 in the mineralogical scale—for surpasses that of all other known stones, and was used even by the ancients to discriminate it from other gems. In specific gravity, 3.52 (or 3.515 to 3.525), it is considerably higher than rock crystal, but nearly the same as the topaz, which may thus be mistaken for it. According to Fizeau, it has its greatest density at 42° C, and below this begins to expand, a property seen in very few other solid bodies. Its expansion by heat is very small, the volume from the freezing to the boiling point of water only rising from 1 to 1.0000035. By friction it becomes positive electric. The so-called compact diamond or carbonado of the stone polishers, found as round grains or masses of one or two pounds weight in the washed sands near Bauna, of a brownish black colour and sp g = 3.012 to 3.416, is porous diamond mixed with a small amount of other matter.

The optical properties of the diamond are also very remarkable. The purest stones, or those of the first water are highly transparent and colourless. But more generally it is less transparent, and shows various tints, specially white, grey, or brown, more rarely blue, red, yellow, green; and very seldom black. Such stones, when the colours are pure, are often highly valued. It is also distinguished by its brilliant adamantine lustre. Newton, two centuries ago, remarked its high refractive power, and from this conjectured that it was a substance of a peculiar nature. The index of refraction is 2.4315 for the red rays, 2.4193 for the yellow, and 2.4278 for the green. This high refractive power, and the strong reflection at both surfaces, render it seldom completely transparent, but give it the high lustre for which it is valued as an ornament. They also produce the numerous internal reflections seen in the interior of cut stones, all the rays of light falling on the posterior surfaces at above 25° being totally reflected. Like all crystals of the same system it possesses only simple refraction, but Dr (Sir David) Brewster found that many showed traces of double refraction by their action on polarized light. This he ascribed to a peculiar tension produced in the interior of the stone during its formation, and a somewhat similar explanation is still adopted. In a history of gems published early in the 17th century, Bostius de Boot conjectured that the diamond was an inflammable body. Robert Boyle, who in 1664 described its property of shining in the dark, or phosphorescing after being exposed to the light of the sun, a few years later observed that a part of it was dissipated in scintillations when subjected to a high temperature. This combustibility of the diamond was confirmed in 1684 and 1690 by experiments with a powerful burning glass or lens made in the presence of Cosmo III, grand duke of Tuscany, by the Florentine Academicians. The experiment of the combustibility of the diamond when freely exposed in a strong heat has been often repeated, and its true character was proved by Lavoisier, who determined that the product was carbonic acid gas. Sir George Mackenzies converted iron into steel by powdered diamonds, whilst Mr Smithson Tennant showed that the carbonic acid produced corresponded to the oxygen consumed. No doubt, therefore, now remains that the diamond is only pure carbon in the crystallized condition, and like it insoluble in acids.

In regard to the action of heat on the diamond, various experiments have been made. Before the blowpipe it is insubstantial, and closely packed in powdered charcoal it can resist a very high temperature. But when oxygen is present it burns slowly at a temperature usually given at about that of melting silver. Gustaf Rose lately found that when air is excluded diamonds exposed to a temperature at which pig-iron melts, or to the strongest heat produced in the porcelain kiln, undergo no change; but at a higher temperature, like that at which bar-iron melts, they begin, whilst retaining their form, to be converted into graphite. He further observed that when diamonds and graphite were exposed together in the same muffle, foliated graphite was far more difficult to burn than the diamond, but compact graphite was converted more readily. In the current of air the diamond gradually became smaller and smaller, but retaining its brilliancy till it finally vanished.
DIAMOND

The faces also during burning became marked with peculiar triangular hollows, with their sides parallel to the edges of the octahedron. Seen in a strong light they appear as faces of an icostetrahedron, whilst other regular triangular impressions on the faces of natural crystals of diamond are produced by faces of the dodecahedron. (Roes, "Ueber den Brauch der Diamanten," etc., in Berlin Monatsschriften, June 1872.)

India is the oldest, and was long the most celebrated, or rather the only, source of diamonds. They have been obtained from a wide district on the eastern side of the Deccan, extending from the Pennar river in 14° N. lat. to near the Sone, in Bundelkund, in 25° N. lat. In the south the chief mines were at Cuddapah, Karnul, and Ellore, near the Ksams, in Madras presidency. In this district some of the largest Indian diamonds were obtained, Golconda, however, not being a mine, but a fortress where the diamonds were collected. There were other mines near Nagpore, and east at Sambalpur, on the Mahanuddy, and north at Panna, in Bundelkund. At all of these the diamond was sought chiefly in recent deposits, beds of sand and clay, or in some places a ferruginous sandstone or conglomerate, but probably none of them the original matrix. Heyne states that the diamond has hitherto been found only in alluvial soil, or in the most recent rocks; and that the stones are not scattered through the whole of these beds, but confined to one rather harder than the rest. The upper stratum, of 18 inches, consists of sand, gravel, and loam; next there is a deposit of stiff black clay or mud, about 4 feet thick; and next the diamond bed, which is distinguished by a mixture of large rounded stones. It is from 2 to 2 ½ feet thick, closely cemented together with clay. Sometimes this stratum is covered with calcareous tufts. Here shallow pits are excavated, of a few feet in diameter, in such spots as the practice of the workman may induce him to select; he sinks to a depth of a few feet, and searches the bed which he considers most promising for his purpose; and if he meets with little encouragement, he shifts his situation and proceeds elsewhere. Thus a great deal of the country may be turned to waste and neglected. The working was chiefly in the hands of certain tribes or castes, but was conducted on no regular plan, and afforded a very miserable livelihood. There has been little change since, and though mines still exist at Panna, Karnul, and a few other places, but comparatively few diamonds are found, and probably scarcely pay the expense of collecting them. Diamonds have also been long collected in Borneo, at Pontians, near the southeast extremity of the island. They occur in a red clay along with gold and platinum, and the rajah of Mantan is said to possess one weighing 367 carats, of the purest water, but uncut.

During the end of last and the beginning of the present century the supply of diamonds chiefly came from Brazil. They were first recognized in 1727 in the province of Minas Geraes, where they had been long used by the negroes as counters in playing cards. The principal mines are still in that province near Diamantina (formerly Tejuco), in that province near Diamantina (formerly Tejuco), as counters in playing cards. The principal mines are still in that province near Diamantina (formerly Tejuco), and near Diamantino in Matto Grosso. Mines have also been recently worked in the province of Bahia. Other localities are enumerated in the articles Brazil. The diamonds are chiefly obtained from the Cascalho, a loose, gravelly deposit mixed with red clay, and containing large lumps of quartz and grains of gold. This rock is probably derived from the itacolumite, a quartzose variety of mica slate, or metamorphosed sandstone, on which it often rests, and in which diamonds are also said to occur. When first brought to Europe the Brazil diamonds were regarded as inferior to those from India, but without reason. Though the mines are strictly watched as Crown property, the produce is not well ascertained. Martius estimated that in the forty-six years from 1772 to 1818 diamonds weighing about 3,000,000 carats, and worth £7,000,000, were exported. Mr Mawe stated the produce at 25,000 to 30,000 carats annually of rough diamonds, equal to 8000 or 9000 carats when reduced to brilliants. After his time it seems to have greatly decreased, the whole value from 1861 to 1867 being given at about £1,900,000; and the discovery of the Cape diamonds has further reduced the amount. The stones are mostly small, averaging little more than one carat, and very rarely exceeding twenty carats. The largest diamond from Brazil was long an uncut octahedron of 120 carats, but in 1854 a fine stone of 254½ carats was sent to London. It was an irregular dodecahedron, but of brilliant lustre and with no flaws. Since cut it weighs about 124 carats, and is known as the "Star of the South."

Diamonds occur in other parts of America, having been found in the Sierra Madre, south-west of Acapulco in Mexico; and a few also in Georgia and North Carolina. They have also been obtained in California, but all small (under 2 carats); and in the district of Arizona, where one is mentioned of 3 carats.

In 1829 diamonds were discovered on the European side of the Ural mountains, and washed from a bed of sand in mines of Bissersk. Engelhardt conjectured that they were derived from a dolomite rock, but others state that it is mica slate like that of Brazil. Only about seventy were found in the first twenty years, and all of them small, the largest weighing under 8 carats. The only other European locality is at Blachkowitsch, in Bohemia, where a single diamond was found in the sand containing pyrope,—the one said by Murray to have been picked up in a brook in Ireland being very doubtful.

Not more important are those from Australia, where they were found as early as 1852, and again in 1859, on the Macquarie river. In 1869 they were discovered in the Mudgee, near one of the tributaries of the Macquarie, by gold-diggers, and worked for a time pretty extensively. They lie there in old river drift covered by basalt said to be of Pliocene age. They occur in a similar position in the Bingera diamond field. In both places they are sparingly distributed and small, the largest mentioned being under 4 carats.

Far more important are the diamond fields of South Africa. In 1857 a Dutch farmer obtained from a boer a bright stone which his children were using as a plaything. This stone was sent to the Cape, where its true nature as a diamond was recognized, and subsequently forwarded to the Paris exhibition and sold for £500. This valuable discovery soon led to further researches, and diamonds were obtained from various places near the Orange and Vaal rivers in Griqua Land West. They were first collected by washing recent alluvial or supposed lacustrine deposits, apparently the detritus of rocks in the vicinity, that are spread over the lower river valleys, but are now rather sought for in "pans," or "pipes," of a circular form running down into the inferior strata, or shale, and filled with a peculiar igneous rock, named diabase, or gabbro, often much changed near the surface. Throughout this rock, which has been penetrated to a depth of from 100 to 200 feet, diamonds are disseminated weighing from over 150 carats down to the 100th of a carat, or less. Many are entire, well-formed crystals, but a large proportion are broken and isolated fragments. Hence it has been inferred that the rock in which they now occur is not the matrix or mother rock in which they were originally formed, but that the "pipes" are rather channels by which volcanic matter has made its way to the surface, bringing the diamonds along with it from some inferior deposit. However this may be.
DIAMOND

Diamond-digging has become a regular branch of industry to a large population; and it is probable, though no very accurate estimate can be formed, that nearly fifteen million pounds sterling worth of diamonds have been obtained from this district since their discovery. The largest diamond from the Cape we have seen mentioned in the Stewart, of 2953 carats, found on the Vaal river in 1872. It was an irregular octahedron of the purest water, and 1 1/4 inch in diameter, and is of a light yellow since cut.

There has been much speculation regarding the mode of origin of these gems, but hitherto having to no certain result. Newton conjectured that the diamond was "an aqueous substance coagulated;" Jameson thought it might be a secretion from some ancient tree, like amber; and Brewster also traced it to a vegetable source. Lavoisier, Gaylussac, and others observed black specks when diamonds were burned, which were considered as uncrystallized carbon. Petzhold, in 1842, also supported this view, affirming that he had found vegetable cells in the ashes of diamonds. Goerperdt, in his Harzlam Prize Essay, in 1853, supported the same view, both from supposed plant traces and from other inclusions in diamonds, but admitted that the evidence was not free from doubts. Liebig and others have explained its origin by a slow process of decomposition in a fluid rich in carbon and hydrogen. On the other hand, the occurrence of the diamond in the rock-salt or mica slate, and more recently in or near igneous rocks, as at the Cape, has tended to favour the view that it owes its origin to heat or metamorphic action, as in the case with graphite. But this, as graphite also shows, does not preclude the idea that originally it may have been, like amber, some peculiar vegetable product, subsequently altered and crystallized. It may be here also be mentioned that all attempts to produce diamonds artificially have hitherto failed.

Diamonds are chiefly used and valued as ornamental stones, and for this purpose they are cut in various forms according to the original shape of the crystals. It is probable that the Indians knew some method of doing this at an early period, and it is said there were diamond-polishers in Nuremberg even in 1573. Bergbom of Bruges has the credit of having first used, in 1426, their own powder for this purpose. He found that by rubbing two diamonds on each other, the surfe areas were polished and facets formed, and acting on this hint, he employed diamond powder and a polishing wheel. His countrymen continued to follow out the art with great success, but some two centuries ago the English cutters were the more celebrated. The trade then reverted to Holland, but is again returning to Britain, where many of the finest stones are cut. The method has undergone little change, and is still chiefly effected by the hand, partly by rubbing one stone on another, partly by a wheel and diamond powder. Where there are flaws or large pieces of value to be removed, they are occasionally cut by iron wires armed with the powder, or split by a blow of a hammer and chisel in the direction of the natural cleavage. The latter is, however, a dangerous process, as the diamond is very brittle, and many valuable gems have thus been destroyed. When reduced to a proper form, the facets are polished on a lapidary's wheel. The process demands not only great skill but much time and labour. The period required to reduce a stone of 24 or 30 carats to a regular form extended formerly to at least seven or eight months of constant work, and in the case of the Pitt diamond two years were needed; but the time is now greatly shortened by the use of machinery driven by steam. Jewellers have long cut diamonds in these forms—the brilliant, the rose, and the table. The brilliant is most esteemed, as giving highest effect to the lustre, and implying less reduction of the stone. It is, as it were, a modification of the primary octahedron, the most common form of crystal, and is shown in its first form in figs. 6 and 7, and with the full number of facets in figs. 8 and 9. Figs. 4 and 6 show the upper surface, with the table, or principal face, in the middle, surrounded by the bezel, or upper faces, lying between its edge and the girdle, or common base of the two pyramids. The lower face corresponding to the table is named the collet, and the whole portion below the girdle the collet sole. The portion removed to form the table (generally 1/12th) and the collet (1/18th) is shown in fig. 10. Brilliant are usually set open, both the upper or table side and the lower collet-side being exposed. The rose cut (upper view, fig. 11, lateral view, fig. 12) is given to stones which have too little depth to be cut as brilliants, it has the whole upper curved surface covered with equilateral triangles. The table diamond, figs. 13 and 14, the least beautiful, is adopted for broad stones of trifling depth, showing a series of four-sided facets above and below the girdle. Recently brilliants are cut in the star form (fille à étudier), with the table above only one-fourth the diameter, and thus with less loss of weight. There

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Fig. 6.-Showing cutting of brilliant.

Fig. 7.-Fig. 6-9.-Showing cutting of brilliants.

Fig. 8.

Fig. 9.

Fig. 10-

Fig. 11.
are also "mixed" or less regular forms used to suit the shape of the stone; and even splinters of diamond of \( \frac{1}{4} \) carat are faceted. In all the forms the girdle ought to be perfectly smooth, as a rough edge often appears through some of the facets as a flaw, and injures the brilliancy of the stone.

Value. The value of diamonds is determined chiefly by their size, weight, colour, freedom from flaws or stains, and the skill with which they are manufactured. Their weight is reckoned by the carat, of four diamond grains, originally an Indian weight. In England the carat is estimated as \( \frac{1}{3} \) 174 grains troy; but it varies in different places, being, according to Schrauf, in Amsterdam \( 205 \frac{70}{90} \) milligrammes, in Florence \( 205 \frac{70}{90} \), in London \( 205 \frac{70}{90} \), in Madrid \( 207 \frac{53}{90} \), in Paris \( 205 \frac{50}{90} \), and in Vienna \( 208 \frac{13}{90} \). The usual rule is that the value of the stone increases with the square of the weight in carats, and assuming \( \£ 5 \) or \( \£ 10 \) as the value of a cut brilliant of first quality in water and shape, weighing 1 carat, a similar stone of 3 carats would be worth four \( (2 \times 2) \times \£ 5 \) or \( \£ 20 \), i.e. \( \£ 29 \) to \( \£ 40 \); one of 3 carats nine \( (3 \times 3) \times \£ 5 \), or \( \£ 72 \) to \( \£ 90 \); and so in proportion. Fine brilliants, however, of the sizes most in demand sell much higher, or from \( \£ 12 \) to \( \£ 20 \) or more the first carat; whilst roses and tables are of considerably smaller value, and rough or blemished diamonds, generally sold in lots, fetch only about \( \£ 2 \) or even less, the value being further diminished in all cases where the stones are "off colour," that is milky or tinted, or imperfect in other respects. Still more important is the state of supply and demand, especially for the largest and most valuable stones, for which there are often very few purchasers, and their price is thus lower than the rule would imply. Even political events affect the price by bringing many into the market, as at the time of the first French Revolution. In 1873 Cape diamonds were stated to be worth—yellows under 5 carats, 40s. to 50s.; above that weight, \( £ 3 \) to \( £ 4 \) per carat; pure white stones under 5 carats, \( £ 3 \) to \( £ 4 \); and above 5 carats, \( £ 4 \) to \( £ 7 \), or more according to form or idiosyncra cy. Fig. 15 shows the size of

FIG. 18.-Koh-i-noor.

set stones round the girdle, the line indicating their depth, and the numerals the number of carats they may be expected to weigh.

Some diamonds are remarkable for their size or history. The largest undoubted diamond is the Orloff in the sceptre of the emperor of Russia, weighing 194\( \frac{3}{4} \) carats, and cut in the rose form, with a flat face below, resembling the half of a pigeon's egg. According to one story, it formed the eye of an Indian idol, and was stolen by a French desperado; another is that it belonged to Nadir Shah of Persia, and on his murder came into the hands of an Armenian mercenary, who brought it to Amsterdam. In 1772 it was sold to Count Orloff for the Empress Catherine for 450,000 silver roubles (\( £ 90,000 \)), with an annuity of 4000 roubles and a title of Russian nobility. Second to it is the Re- gent or Pitt diamond (fig. 16), bought by Mr Pitt, the governor of Madras, in 1705, for about \( £ 20,000 \). He brought it to London, had it cut as a brilliant, and cut it in 1717 to the regent dukes of Orleans, for Louis XV., for 21 million francs, or \( £ 130,000 \); but it is estimated to be worth fully twice that sum. At the time of the first French Revolution it was sent to Berlin, but re-appeared in the hilt of the sword of state worn by Napoleon I. It is considered as the finest and most perfect brilliant in Europe. It weighs 136\( \frac{3}{4} \) carats, but originally weighed 140 carats, and the smaller half or sawn from it when cut were valued at some thousand pounds. The third in weight is the Florentine, or Grand Duke, as it is named (fig. 17). It is of a fine yellow colour, oblong, and cut in rose. It is said to have been lost by Charles the Bold at the battle of Granson, and found by a Swiss soldier, who sold it for a few pence as a piece of rock crystal. It afterwards belonged to the grand duke of Tuscany, from whom it passed to the emperor of Austria. Its weight is usually given at 139\( \frac{1}{4} \) carats, but Schrauf finds its exact weight 133\( \frac{16}{20} \) Vienna carats, and its specific gravity at 19° C. 3\( \frac{5}{28} \). The Koh-i-noor (fig. 18), the largest belonging to the British Crown, has also a singular history, corresponding to that of the country of its origin. The Indian legend tells that it was found in one of the Golconda mines near the Kishna river, and worn 5000 years ago by Karna, one of the heroes celebrated in the Mahabharata. It passed through many hands to Baber, the founder of the Mogul dynasty, in 1526, and was shown by his successor in 1655 to Tavernier, the French traveller. He describes it then as of the shape of a half egg, and weighing 280 carats, having been thus reduced by an unskilled stone-cutter from 793\( \frac{1}{2} \) carats, which it once weighed. In 1739 it passed to Nadir Shah, the Persian invader of India, who gave it the name of Koh-i-noor, or Mountain of Light, and from his successors in 1713 to 1803, the ruler of Apache. In 1849, on the annexation of the Punjab to British India, the Koh-i-noor was also surrendered and presented to the Queen in June 1850. It was exhibited in the Great Exhibition of 1851, and then weighed 186\( \frac{4}{5} \) carats, but has since been recut, with doubtful advantage, in the rose form, and is now 106\( \frac{1}{2} \) carats. Its lower side is flat, and undoubtedly corresponds to a cleavage plane. Hence it has been conjectured that it and the Russian Orloff diamond are portions of the original stone belonging to the Great Mogul, whilst a stone of 132 carats, obtained by Abbas Mirza at the storming of Cooch, in Khorassan, in 1832, may be a third fragment. This portion was long used by a peasant as a flint for striking fire. The three united would have
nearly the form and size given by Tavener, and the Koh-i-noor would then surpass all known diamonds in its magnitude as in its eventful history.

It is not necessary to notice in detail other diamonds of smaller size, as the Sancy, of 53½ carats, once the property of Charles the Bold, like the Alstern, and afterwards of Louis XIV. of France, but sold in 1830 for £20,000 to the emperor of Russia. In the Russian treasury are also the Shah of 86 carats, and the Polar Star of 40. Other noted ones are the Naasac of 89½ carats (now recut, and 78½), the Puggot of 92, and the Pasha of Egypt of 40 carats, which cost £28,000. Some are valued for other properties, as the Hope diamond, of a rare colour, a fine blue, and high brilliancy, estimated at £25,000, though only weighing 44½ carats. Red diamonds seem very rare, but there is a brilliant of 10 carats among the crown jewels of Russian, which cost £16,000, and in Dresden some very fine yellow stones, the largest of 29½ carats.

Perhaps even more important is the use of the diamond for cutting glass, for polishing gems and other hard bodies, and recently by engineers for boring machines used in forming tunnels and artemian wells. The glaziers' diamond is so-called "bort," recently by englllels for boring machines used in forming tunnels and artesian wells. The glaziers' diamond is perhaps even more important, but its commercial value is comparatively less, as it is chiefly employed both for polishing purposes, and for boring machines. In the latter the stones are fixed in a ring of steel, made to rotate with great rapidity, and kept cool by a current of water, which also removes the detritus. In consequence its price has risen lately from about 1s. to 18s. or 20s. a carat.


DIANA, who was at a later period revered as the Greek Artemis by the side of Apollo, was originally an independent deity of Italy, as Apollo. It is said, is shown by this name, which is the feminine form of Jeus. She is essentially the moon goddess, and presides over wood, palm, and water, as well as over the changes of human character, and the special functions of the female sex, also over chase and war. Diana was worshipped by the Sabines, but more especially by the Etrusci, Etrusci, and Latins, whose united sanctuary lay in the wooded hills of Algidus beyond Tusculum. Diana had also a sanctuary in Anagnia, the capital of the Etruscans, and another in Corna, near Tusculum. But more celebrated than all these was the grove and sanctuary of Diana of Aricia, on the Lake of Nemi, which gave the name of Nemorensis to Diana. Here she was worshipped nude by side with a male deity Viribus. After the destruction of Alba Longa this grove was for a long time the united sanctuary of the neighbouring Latin and Rutulian cities, until at last it was extinguished beneath the supremacy of Rome. The festival of the goddess was on the Ides of August, the full moon of the hot season. She was worshipped with torches, her temple sought by women seeking a happy deliverance in childbed, and many votive offerings have rewarded modern excavations on the site. Another celebrated sanctuary of Diana was on the slopes of Mount Tifata, near Capua, where she was worshipped under the name of Tifatnna. This sanctuary was especially favoured by Sulla and at a later period by Vespasian. There were several ancient groves and sanctuaries of Diana in Rome, one in the Vicus Patricius between the Viminal and Esquiline, into which no man was admitted, another at the highest point of the Vicus Cypros, another on the Caelian. But the most celebrated of all was the temple on the Aventine. This was originally a sanctuary of the Latin League, which accounts for the hill not being included in the original circuit of Rome, and for its being the refuge of the Cumaeans in political disturbances. The statue of the goddess was of the Ephesian type, the day of dedication was the idea of August, and the temple was especially frequented by slaves and their wives. Runaway slaves throughout Italy had a special dependence upon Diana. Such are the chief characteristics of the Roman Diana, but as early as 400 B.C. she began to be identified with the Greek Artemis, of which an account has already been given (see Artemis) For fuller information see Preller, "Romische Mythologie."
appears to differ in the case of several of them. Thus antimony and ipecacuan appear to produce their diaphoretic action by their nauseating and depressing or relaxing effects, while others seem to act as direct stimulants to the function of the sudoriparous glands of the skin, such as the well-known diaphoretics—Mindererus spirit (acetate of salicylic) and guaiacum, which contains a strong diaphoretic, and the reduced drug, jabarandi. Opium acts powerfully as a diaphoretic, especially when in combination with ipecacuan, as in Dover's powder, or with antimony; and alcohol has similar properties. Diaphoretics are of great service in many diseases. When employed at the commencement of a catarrh or common cold they frequently check it, and thus prevent the evils which are so apt to follow this affection. In acute dropsy due to kidney diseases, such as that which sometimes results from scarlet fever, the hot air or hot water bath is a valuable remedy, and even in dropsical accumulations of long standing, when diaphoresis can be induced, marked improvement in the symptoms generally follows. In certain circumstances, however, diaphoretics, particularly in the form of baths, may be unsafe, especially where there is any affection of the heart or lungs attended with embarrassed respiration; and in general in diseases where diaphoresis seems to be indicated, the physician is required to take into account the patient's whole condition and his selection of any one remedy for this purpose.

DIARBEKIR (or Kara Amid, the Black Amid), a city of Asiatic Turkey, the administrative centre of the pashalik of the same name, is situated 2050 feet above the level of the sea, on a mass of basaltic rock which rises abruptly to a height of 100 feet from the western bank of the Tigris, about 100 miles north-east of Aleppo, in 37° 36' 53" N. lat. and 39° 53' 39" E. long. It is about three miles in circumference, has a nearly circular form, and is encompassed by ancient and dilapidated walls of a very remarkable character. They are built of basalt, have in most places a thickness of 14 feet, vary in height from 30 to 40 or 50 feet, and are strengthened by upwards of 70 towers, some square and some round, which communicate with each other by two passages formed in the heart of the masonry. There are four gates, which are closed at night:—the Daghi Kapi, or Mountain gate, on the N.; the Rum Kapı, or Anatolian gate, on the W.; the Mardin gate on the S.; and on the E. the Eyopri gate, which takes its name from the stone bridge that spans the Tigris. In the four gates and the walls bear numerous ornamental designs and inscriptions in Arabic and Cufic characters relating to their erection or restoration. The citadel, or İskhalı Kalb, which stands in the north-east corner between the Daghi Kapi and the Kyopri Kapi, commands the town; and a fine view of the valley of the Tigris is obtained from one of its towers, supposed to be the belfry of an ancient Christian church. Within the encinte is the official residence of the pasha, but he has another mansion at some distance from the town in the vicinity of the military barracks. The interior of the town contrasts unfavourably with the massive and spacious character of its defences; it has only one street about 20 feet in breadth, the rest being mere lanes from 4 to 5 feet across. The houses are built of basalt in the lower stories and of dark-coloured brick above; and this, combined with the flat terraces of the roofs, gives a sameness and gloominess of aspect. The public buildings comprise upwards of 50 mosques large and small, 9 Christian churches, a Jewish synagogue, upwards of 200 houses about 15 khan or caravanserais, and a good military hospital; but only a few are worthy of individual notice, though some of the minarets are richly sculptured, and several of the mosques preserve interesting traces of ancient work. The Ulü-jami, or Great Mosque, which was formerly a Christian church, and perhaps originally the ancient palace of Tigranes, has an outer wall with two façades, each formed by a row of Corinthian columns surmounted by an equal number of a Byzantine type; the interior is divided into three portions, appropriated to as many Mahometan sects. The Hassan Pasha Kham in the immediate vicinity of the mosque, is a fine building constructed of layers of white and black stone, and the reception it is exceeded in size by the Ali Pasha Khan, which indeed is the largest in Asiatic Turkey. The town is supplied with water both by springs within the walls and by an aqueduct fed by a fountain at Ali-paun about two miles to the west, but in the heats of summer, which are sometimes exceedingly severe, these supplies become greatly exhausted and the water impure. In the last century Diarbekir was one of the largest and most flourishing cities of Asia; and as a commercial centre it still ranks second to Mosul, in the upper region of the Tigris and Euphrates. The principal trade routes are by Arigus and Khans to Samoun, by Sort, Butus, and Van, to Tabraz, by Mardin to Mosul, by Urfa and Ambab to Aleppo, and by means of kalileks, or inflated skins, down the river to Mosul and Baghdad. The bazaars are not much behind those of Baghdad, and display a rich variety of both Asiatic and European wares. Owing partly to the introduction of the latter, the manufacturing industry of the town has chiefly decreased, and consists of the 1600 lamps of which it could boast in 1816 laws disappeared. Red and yellow incresco of the greatest repute throughout Asiatic Turkey is still produced, as well as copper vessels, pipes, heads, and goldsmith-work. The population, which was reckoned at 400,000 in 1760, was in the latter part of the century greatly reduced by war, and famine, and pestilence. In 1837 it was estimated by Southgate at from 13,000 to 14,000 souls; in 1856 it was found to be 27,430; and in 1873 it was stated by Cernik at 40,000, and by another authority at 60,000. The principal nationalities in the polyglot community are the Kurds and Armenians, but there are also numerous Turkomans, Turks, and expelled Bulgarians. The Mahometans and Christians are now pretty equally balanced in numbers. Besides representatives of the Armenian, Syrian, and Greek churches, there are Roman Catholics enough to support a church and convent, and a mission is maintained by American Protestants.

Diarbekir is the city which, under the name of Amida, became a Roman colony in 230 A.D. and received a Christian bishop in 325. Fortified by Constantius II. it was before long captured by Sapor I. and Persians kung, after a siege of 15 years, to which a detailed account of his personal experience is given by Ammianus Marcellinus, and in the later wars between the Persians and the Romans it more than once changed hands. On its capture by the former in 602, it is said that 80,000 of its inhabitants perished. After having been from about the 11th century in the possession, by no means uninterrupted, of several Turkish dynasties, it was finally captured by Selim, the first Sultan of the Osmanli Turks, in the year 1515, and since that date it has remained under the Ottoman rule.


DIARRHEA (from δραρ, through νεφος, bowels), loosening of the bowels. The causes of this complaint are very numerous. As a primary affection it has been treated of under Choler (q. v.). It is frequently a symptom or complication of other diseases, such as consumption or typhoid fever, and as such it will be mentioned in describing the various ailments in which it occurs.

DINAMONTE (1583-1684), a Brazilian poet and historian, was born at the little town of Caxias, in Maranhão, with the charms of which he has made his readers familiar. From the university of Coimbra, in Portugal, he returned to his native country well-equipped with legal lore, and obtained an official appointment at Maranhão; but the literary tendency which was strong
Within him led him to try his fortune as an author at Rio de Janeiro. Here he wrote for the newspaper press, ventured to appear as a dramatist, and at last in 1846 established his reputation by a volume of poems—Primeros Cantos—which appealed to the national feelings of his Brazilian readers, were remarkable for their autobiographic impress, and by their beauty of expression and rhythm placed their author at the head of the lyric poets of his country. In 1848 he followed up his success by Segunda Cantos e seis Tesouros de Frei António, in which, as the title indicates, he puts a number of the pieces in the mouth of a simple old Dominican friar, and, in the following year, in fulfillment of the duties of his new post as professor of Brazilian history in the imperial college of Pedro II, he published an edition of Berredo, and added a sketch of the migrations of the Indian tribes. A third volume of poems, which appeared with the title of Ultimos Cantos in 1850, was practically the poet's farewell to Rio de Janeiro and the service of the muse, for he spent the next eight years engaged under Government patronage in obtaining a personal acquaintance with similar position institutions of Europe, was appointed on his return to Brazil a member of an expedition for the exploration of the province of Ceará, was forced in 1852 by the state of his health to try the effects of another visit to Europe, and died in September 1854 on board the vessel that was bearing him once again to his native shores. While in Germany he published at Leipzig a complete collection of his lyrical poems, which has since gone through several editions, the four first cantos of an epic poem called Os Typhonos (1837); and a Dicionario da Língua Tupy (1838). To the publications of the Rio de Janeiro Geographical and Historical Institute he contributed a number of papers, among which the one on Brasil and Oceana has received special notice. A complete edition of the works of Dias has made its appearance at Rio de Janeiro. See Francisco Sutero in the Revista Maranhense, and Wolf, Diret Littéraire.

Dias, Bartolommeo, a Portuguese navigator, the discoverer of the Cape of Good Hope, flourished towards the close of the 15th century, the date of his birth being unknown. He seems to have interested himself at an early period in geographical research, and to have been intimately connected with Martin Behem. In August 1488 he was appointed by King John II. to the command of a small expedition intended to carry on the work of exploration on the coast of Africa. After touching at various points on the western shore of the continent, and taking possession of them for his royal master, he sailed onward into the unknown sea and discovered the Cape without being aware of it. He touched land at the mouth of the Great Fish River. He now found that he had rounded the continent, and in his return voyage he sighted the promontory to which he gave the name Cape of Storms, or Cabo de todos los tormentos (Cape of all the Storms). This was afterwards changed by the king for the happier title it still bears. Dias arrived in Lisbon in December 1487. He afterwards commanded a ship in the first expedition of Vasco da Gama, who sent him back to Portugal after they had reached the Cape Verde Islands. He held a similar position in the expedition under Cabral which discovered Brazil. On the return voyage the vessel he commanded founded in a storm on the 29th May 1500.

Diatomaæ. For the knowledge we possess of these beautiful organisms, so minute and at times so indiscernible by our unaided vision, we are indebted to the assistance of the microscope. It was not till towards the close of the last century that the first known forms of this group were discovered by O. F. Muller. And so slow was the progress of discovery in this field of scientific research that in the course of half a century, when Agardh published his Systema Algarum in 1821, only 49 species included under 5 genera had been described. Since that time, however, the microscope has been greatly improved, and excellent naturalists in all parts of the civilized world have been induced to engage in the study of these forms. The result is that the number of known genera and species has been greatly increased, the species found in Great Britain and Ireland may be estimated at little less than 1000, and Rabenhorst, in his index to Flora Europaea, enumerates about 4000 forms which have been discovered throughout the continent of Europe. At a time when little was understood of the structure of these organisms they were generally known among botanists by the appellation of Bacillariasæ, but almost all recent authors are agreed in adopting the later and more appropriate designation of Diatomææ.

Various opinions have been entertained as to the position to be assigned to these forms. The earlier observers referred them to the vegetable kingdom. Subsequent authors, including Ehrenberg, regarded them as animales, but in consequence of their analogy to other organisms acknowledged to be vegetable, as regards their general structure, and more especially their modes of reproduction, they are now almost universally included in the vegetable kingdom, and classified with the Monocellular Algae.

The Diatomææ exhibit great variety in form. While some species are circular, as Coscinodiscus perforatus (fig. 1), others are of an oval outline, as Surirella ovata (fig. 2).

Fig. 1—Coscinodiscus perforatus x 400
Fig. 2—Surirella ovata x 400

Some are linear, as Synedra radians (fig. 3), others more or less crescentic, as Epithemia hyalina (fig. 4); others, again, are cuneate, as Podosephora lagenoides (fig. 5); some few have a sigmoid outline, as Pleurosigma balticum (fig. 6), but the prevailing forms are naviculoid, as Navicula crassa (fig. 7). They vary greatly also in their modes of growth,—some being free, others attached to foreign bodies by gelatinous stipes, the stipes being in some species very short, while in others they are of considerable length. In some genera the forms are simple, while in others the frustules are connected together in ribbon-like filaments, or form, as in other cases, zig-zag chains. In some genera the frustules are lagenoid, as Podosephora lagenoides x 400. In many others they are inclined in a more or less definite gelatinous investment, or frond, VII. — 22
as this covering is usually designated. The conditions necessary to their growth are moisture and light. Wherever these circumstances coexist, diatomaceous forms will almost invariably be found. They occur mixed with other organisms on the surface of moist rocks; in streamlets and pools, they form a brownish stratum on the surface of the mud, or cover the stems and leaves of water plants or floating twigs with a furry investment. Marine forms are usually attached to various sea-weeds, and many are found in the stomachs of molluscs, holothurians, ascidians, and other denizens of the ocean. The fresh-water forms are specifically distinct from those incidental to salt or brackish water.—Fresh-water species, however, are sometimes carried some distance into the sea by the force of the current, and in tidal rivers marine forms are carried up by the force of the tides. Some motion may be formed of the extreme minuteness of these forms from the fact that one the length of which is 10,000ths of an inch may be considered as beyond the medium size. Some few, indeed, are much larger, but by far the greater proportion are of very much smaller dimensions.

Structure. These minute vegetables are distinguished from kindred forms by the fact of having their soft vegetative part covered by a siliceous case. This covering of silica consists of two similar valves nearly parallel to each other, each valve being furnished with a rim projecting from it at a right angle. One of these valves with its rim is slightly smaller than the other, the smaller fitting into the larger pretty much as a pill box fits into its cover. This peculiarity of structure affords ample scope for the growth of the cell contents usually known as the endochrome. As the endochrome increases in volume the siliceous valves are pushed out, and their corresponding siliceous rims become broader.

As regards the vegetative contents of this cell, in so brief a description the following parts only need to be referred to. There is first what Pfitzer, a distinguished German writer on this subject, designates the plasm-sac, consisting of a fine colourless plasm forming a closed sac of the same shape as that of the cell. The refractive power of this plasm differing but slightly from that of water, the presence of this structure is not always obvious; but on the application of hydrochloric acid its outline may be discerned they were a short time been recorded by various observers which seem to bear out this view of the case. But in this group, as well as in the Desmidium already referred to, there obtains another mode of reproduction which is generally known as conjugation. It would be unnecessary here to describe in detail the various observed modes of this process. Suffice it to say that usually two parent frustules unite, invest themselves in a gelatinous sac in which their cell contents are discharged and formed into two bodies termed sporangia, which soon are developed into two frustules in all respects resembling the parents but usually
double their size. In some phases of this process the gelatinous sac bears a considerable resemblance to that lowest form of animal life known by the name of Amoeba, so much so that an inexperienced observer might suppose that the object before him was an Amoeba gorged with diatomaceous frustules.

**Mode of Preparation.**—The Diatomacea are usually gathered in small bottles, and special care should be taken to collect them as free as possible from extraneous matter. A small portion having been examined under the microscope, should the gathering be thought worthy of preservation, some of the material is boiled in acid for the purpose of cleaning it. The acids usually employed are hydrochloric, nitric, or sulphuric, according as circumstances require. When the operator considers that by this process all foreign matter has been eliminated, the residuum is put into a precipitating jar of a conical shape, broader at the bottom than at the top, and covered to the brim with filtered or distilled water. When the diatoms have settled in the bottom of the jar, the supernatant fluid is carefully removed by a syringe or some similar instrument, so that the sediment be not disturbed. The jar is again filled with water, and the process repeated till the acid has been completely removed. It is desirable afterwards to boil the sediment for a short time with supercarbonate of soda, the alkali being removed in the same manner as the acid. A small portion may then be placed with a pipette upon a slip of glass, and, when the moisture has been thoroughly evaporated, the film that remains should be covered with dilute Canada balsam, and, a thin glass cover having been gently laid over the balsam, the preparation should be laid aside for a short time to harden, and then ready for observation.

**General Remarks.**—Like all other organisms, the Diatomacea doubtless have a definite function assigned to them in the grand system of creation, but a special interest attaches to them. Allusion has been made to the fact that the soft cell of these organisms is encased in a siliceous epidermis. When the plant has fulfilled its natural course the siliceous covering sinks to the bottom of the water in which it had lived, and there forms part of the sediment. When in the process of ages, as it has often happened, the accumulated sediment has been hardened into solid rock, the siliceous exuviae of the diatoms remain unaltered, and, if the rock be disintegrated by natural or artificial means, may be removed from what has been called “their stony abode,” and subjected to examination under the microscope. The forms found may from their character help in some degree to determine the conditions under which the stratum of rock had been originally deposited.

Vast deposits of Diatomacea have been discovered in various parts of the world,—some the deposit of fresh, others of salt water. Of these deposits the most remarkable for extent, as well as for the number and beauty of the species contained in it, is that of Richmond, in Virginia, one of the United States of America. It is said to extend for many miles, and to be in some places at least 40 feet deep. The material has long been used as a polishing powder, and recently has been largely employed in the manufacture of the powerful explosive agent known as dynamite. It is a remarkable fact that existing species of Diatomacea have been traced so far down as the lower strata of the Tertiary formation; and, though the generations of a diatom in the space of a few months far exceed in number the generation of man during the period usually assigned to the existence of the race, the fossil genera and species are in all respects to the most minute details identical with the numerous living representatives of their class.

DIAZ DE LA PEÑA, Narcise Virgile (1806-1876), a French artist, distinguished chiefly as a landscape painter, was born at Bordeaux in August 1806. His first works were exhibited at the Salon in 1831, and attracted little notice, being poor in colour, the quality for which he afterwards became conspicuous. The same criticism applies to the pictures he exhibited annually until 1840, when his style underwent a decided change. His Nymphéas de Calypso (1840), Le Rêve (1841), Vue de Bas-Béran, L'Oriental, Le Maléfice, and Les Bohémianes se rendant à une Fête (1844), showed in an increasing degree the richness of colour and the mastery of the more subtle effects of light and shade which ultimately obtained for Diaz a place in the first rank of landscape painters. His powers were seen at their best in his Bagneuse et L’Amour désarmé (1851), and in the pictures he sent to the Paris Exhibition of 1855, Les Présentas d’Amaur, La Rivale, La fin d’un Beau Jour, Nymphé Endormie, Les Descansas Larmes, &c. As the titles of several of these works indicate, Diaz endeavoured to add to the interest of his landscapes by introducing into them the personages of the classical mythology. Late in his career he devoted himself to genre subjects with but indifferent success. Diaz received a medal of the third class in 1844, of the second class in 1846, and of the first class in 1848, and in 1851 he was made a chevalier of the Legion of Honour. He died in November 1876.

DIBDIN, CHARLES (1745-1814), a well-known writer of songs and musical composer, was born at Southampton on the 15th March 1745, and was the youngest of a family of eighteen. His parents designing him for the church, he was sent to Winchester, but his love of music early diverted his thoughts from the clerical profession. After receiving some instruction from Kent, the organist of Winchester Cathedral, he went to London at the age of fifteen. In the following year his first work, an operaetta entitled _The Shepherd’s Artifice_, with words and music by himself, was produced at Covent Garden Theatre. This proved successful, and was followed by other works, his reputation being firmly established by the music to the play of _The Padlock_, which was produced at Drury Lane under Garrick’s management in 1768, the composer himself taking the part of Mungo. He continued for some years to be connected with Drury Lane, both as composer and as actor, and produced during this period two of his best known works, _The Waterman_ (1774) and _The Quaker_ (1775). A quarrel with Garrick led to the termination of his engagement, and in 1782 he became joint manager of the Royal Circus, afterwards known as the Surrey Theatre. In three years he lost this position owing to a quarrel with his partner. In 1788 he sailed for the East Indies on the invitation of a sailor brother (the “Tom Bowling” of his famous song); but, the vessel having put in to Torbay in stress of weather, he changed his mind and returned to London. A series of mono-dramatic entertainments which he gave at his theatre, _Some Source_, in Leicester Square, brought his songs, music, and recitations more prominently into notice, and permanently established his fame as a lyric poet. It was at these entertainments that he first introduced many of those sea songs which so powerfully influenced the national spirit. The words breathed the simple loyalty and dauntless courage that are the cardinal virtues of the British sailor, and the music was appropriate and naturally melodious. Their effect in stimulating and ennobling the spirit of the navy during the war with France was so marked as to call for special acknowledgment. On returning from public life, in 1805, Dibdin was rewarded by Government with a pension of £300 a year, of which he was only for a time deprived under the administration of Lord Grenville. Dibdin undertook his _Musical Tour through England_ (1788), his _Professional Life_, an autobiography
published in 1803, a History of the Stage (1799), and several smaller works, he wrote upwards of 1400 songs and about 300 dramatic pieces. He also wrote one or two novels which are now forgotten. An edition of his songs by G. Hogarth (1843) contains a memoir of his life. The edition prepared by his son Thomas is referred to below.

DIBDIN, Thomas (1771–1841), English dramatist and son of the subject of last notice, and was born on the 21st of March 1771. He was apprenticed to a London upholsterer, but after four years' service he broke his engagement and joined a company of country players. From 1789 to 1795 he performed in every department of the drama, composing during the same period more than 1000 songs, and making his first attempt as a dramatic writer. He returned to London in 1795, having married two years before; and in the winter of 1798–1799 his Jew and the Doctor was produced at Covent Garden. From this time he contributed a very large number of comedies, operas, farces, &c., to the public entertainment. Some of these brought immense popularity to the writer and immense profits to the theatre. It is stated that the pantomime of Mother Goose produced more than £20,000 at Covent Garden Theatre, and the High-mettled Racer £18,000 at Astley's. Notwithstanding this run of popularity, and the author's connection with theatrical notabilities, his last years were passed in comparative indigence. In 1827 he published two volumes of Reminiscences; and at the time of his death he was preparing an edition of his father's sea songs, for which a small sum was allowed him weekly by the Lords of the Admiralty. He died in London, September 18, 1841.

DIBDIN, Rev. Thomas Frognall (1770–1847), an enthusiastic bibliographer, born at Calcutta in 1770, was the son of Thomas Dibdin, the tailor brother of Charles Dibdin, whom the latter has immortalized in his song "Poor Tom Bowling." His father and mother both died on the voyage home to England in 1780, and he was brought up by a maternal uncle. He was educated at St John's College, Oxford, but left the university without taking his degree. Intended for the bar, he was entered at Lincoln's Inn, and studied for a time in the chambers of Basil Montague. After an unsuccessful attempt to obtain practice as a provincial counsel at Worcester, he resolved to devote himself to law for the church, and he was ordained a clergyman at the close of 1804. His ecclesiastical preferment was slow. For a number of years he had to content himself with the appointment of preacher at various chapels in the West End of London, and it was not until 1823 that he received the living of Eving in Sussex. Soon afterwards he was appointed by Lord Liverpool to the rectory of St Mary's, Bryanston Square, which he held until his death on the 18th November 1847. The first of the numerous bibliographical works on which Dibdin's fame entirely rests was his Introduction to the Knowledge of the Rare and Valuable Editions of the Latin and Greek Classics (1808), which, though superficial, incomplete, and untrustworthy in many of its details, supplied a blank in English literature. A fourth and greatly enlarged edition appeared in 1827. The first edition rendered a valuable service to its author in bringing him under the notice of Earl Spencer, to whom he owed not only his first living but much important aid in his bibliographical pursuits. The rich library at Althorp was thrown open to him; he spent much of his time in it, and in 1814 published his Bibliotheca Spenceriana, giving an account of the many rare works it contained. As the library was not open to the general public, the information given in the Bibliotheca was found very useful, but the work was marred by the inaccuracy in matters of detail which more or less characterized all its author's productions. This fault was naturally least obtrusive in a series of playful, discursive works in the form of dialogues on his favourite subject, in which great exactness was not necessary. The first of these, Bibliomania (1809), was republished with large additions in 1811, and was very popular, passing through numerous editions. To the same class belonged the Bibliographical Decameron, a larger work, which appeared in 1817, and has a higher value than its predecessor, though it did not attain the same circulation. In 1810 he commenced the publication of a new and much extended edition of Aeneas's Typographical Antiquities. The first volume was so great a success that Dibdin realized £500 by it. This, however, was not maintained, and the fourth volume, which did not appear until 1819, fell almost still-born from the press. The work was scarcely half-finished when its publication was thus checked. The chief cause of its failure was that Dibdin had not critical acumen enough to make a thorough change in the arrangement his predecessor had followed, and to make it to distinguish what was valuable from what was worthless in the vast stores of information he had himself collected. In 1818 Dibdin was commissioned by his patron, Earl Spencer, to purchase books for him on the Continent, and he afterwards published an account of his journey in his Bibliographical, Antiquarian, and Picturesque Tour in France and Germany (3 vols. 1821), which was got up in a most sumptuous style, the engravings alone, it is said, costing £6000. In 1824 he published an ambitious venture in his Library Companion, or the Young Man's Guide and Old Man's Comfort in the Choice of a Library, which was intended to point out the best works in all departments of literature. His culture was not broad enough to render him competent for the task, and the Library Companion, being severely criticized in the Quarterly and Westminster Reviews, seriously injured his reputation. He had been for some time involved in pecuniary difficulties, from which he tried to free himself with only partial success by extending the range of his literary activity. He wrote for periodicals, published many of his sermons, and for some years gave himself chiefly to religious literature. He returned to bibliography in his Bibliophobia, or Remarks on the Present Depression in the State of Literature and the Book Trade (1831), and the same subject furnishes the main interest of his Reminiscences of a Cambridge Life (1838). His Bibliographical, Antiquarian, and Picturesque Tour in the Northern Counties of England and Scotland (1838). Dibdin was the originator and vice-president, Lord Spencer being the president, of the Roxburghe Club, founded in 1812,—the first of the numerous book clubs which have done such service to literature in the present century.

DICEARCHUS, a celebrated Peripatetic philosopher, historian, and geographer, was a native of Messana, in Sicily. He was the contemporary of Theophrastus and Aristotle, and flourished towards the close of the 4th century B.C. The exact dates of his birth and death are fixed by good authorities as the year 285 B.C. The exactness with which Dibdin realized the Pantaloon, its circulation. In 1818 Dibdin was commissioned by his patron, Earl Spencer, to purchase books for him on the Continent, and he afterwards published an account of his journey in his Bibliographical, Antiquarian, and Picturesque Tour in France and Germany (3 vols. 1821), which was got up in a most sumptuous style, the engravings alone, it is said, costing £6000. In 1824 he published an ambitious venture in his Library Companion, or the Young Man's Guide and Old Man's Comfort in the Choice of a Library, which was intended to point out the best works in all departments of literature. His culture was not broad enough to render him competent for the task, and the Library Companion, being severely criticized in the Quarterly and Westminster Reviews, seriously injured his reputation. He had been for some time involved in pecuniary difficulties, from which he tried to free himself with only partial success by extending the range of his literary activity. He wrote for periodicals, published many of his sermons, and for some years gave himself chiefly to religious literature. He returned to bibliography in his Bibliophobia, or Remarks on the Present Depression in the State of Literature and the Book Trade (1831), and the same subject furnishes the main interest of his Reminiscences of a Cambridge Life (1838). His Bibliographical, Antiquarian, and Picturesque Tour in the Northern Counties of England and Scotland (1838). Dibdin was the originator and vice-president, Lord Spencer being the president, of the Roxburghe Club, founded in 1812,—the first of the numerous book clubs which have done such service to literature in the present century.

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and derived its name from the fact that the scene of the
dialogue was laid at Leaboo. To it the author afterwards
appended a supplement, likewise in three books, which he
called Coretharchus. The only complete edition of the
fragments of Dicerarchus is that published at Darmsdtnt in
1841 by Max Fuhru. An excellent dissertation on them
will be found in Gouan, Beitrage zur Griech. und Rom.
Literatur.

DICK, THOMAS (1775-1857), a popular writer on
astronomy and other scientific subjects, was born in 1775.
He was educated for the ministry in connection with the
Secession (now United Presbyterian) Church of Scotland,
and was ordained at Stirling in 1803. About two years
afterwards his connection with the church was severed, and
he became a teacher, first at Methven, a village in Perthshire,
and afterwards at Perth. In 1824 he published in two
volumes the Christian Philosopher, a work whose "aim
was," in his own words, "to illustrate the harmony
which subsists between the system of nature and the system
of revelation, and to show that the manifestations of God in
the material universe ought to be blended with our vast
wit the facts and doctrines received in the volume of
inspiration." The success of this work enabled him to resign his
labours as teacher, and in 1827 he removed to Broughty
Ferry, a suburb of Dundee, where he devoted his whole
time to literary and scientific pursuits. Besides the
Christian Philosopher, he is author of the Philosophy of a
Future State (1828), the Improvement of Society by the
Diffusion of Knowledge (1833), Celestial Scenery (1837),
The Sidereal Heavens (1810), and several smaller treatises.
These works were all intended to supplement and extend
the range of the Christian Philosopher, and may be regarded
as attempts by means of didactic discoveries to illustrate
particular aspects of religious truth, and to suggest solutions
of difficult religious problems. They are written in a
popular and fascinating style, and manifest great aptitude
for simplifying scientific subjects, and rendering them
interesting to non-scientific readers. Some years before his
death, which took place 27th July 1857, a pension was
conferred on him by Government.

DICKENS, CHARLES (1812-1870), the great English
novelist, was what would generally be described as a self-
educated man, and, yet, if by a man's education we understand
preparation for the work he has to do in life, he was
indebted to circumstances for an education on which it
would have been difficult to improve. His father was a
clerk in the Navy Pay Office, stationed at Portsmouth
when Charles was born, but soon afterwards at Chatham,
and London,-a conscientious man, industrious and punctual in his occupation, but too easy
tempered and unpractical to expend his income so as
to keep pace with the wants of a rapidly increasing family.
The boy's mother seems to have been a person of more
energy, as well as of considerable accomplishments; she
taught him the rudiments of Latin, and tried to establish
a boarding school in Gower Street. The one parent was
the original of Micawber, the other the original of Mrs
Nickleby. With all their united efforts they could not
keep out of distress, the boarding school scheme came
doomed; and when Dickens was nine years old the family
was living in abject poverty in Byham Street, Camden
Town, then one of the poorest London suburbs, and their
difficulties were increasing upon them. Charles was sent
out to earn six shillings a week in a blacking warehouse,
typing blue covers on pots of blacking. For two years
the child led a very hard, uncared-for life at this uncongenial work. He bitterly felt that it was uncongenial, for
he was a very precocious boy, had read many books, and
had formed an ambition to be "a learned and distinguished
man." It must have been very galling to him, with his
prematurely developed sensibilities and aspirations, to be
thrown among such companions as Bob Fagin and Poll
Green. And perhaps he was right in afterlife to wonder
at the thoughtlessness of his parents in subjecting him to
such a humiliation. His sufferings were so acute, and
made such an impression on him, that years afterwards he
could not think of them without crying, and there were
certain quarters of the town through which he used to pass
to his daily work, and where he used to loiter with less than
enough to eat, that he habitually shunned for their painful
memories: "It is wonderful to me," he wrote when in the
height of his fame, "how I could have been so easily cast
away at such an age. It is wonderful to me that, even
after my descent into the poor little drudge I had been
since we came to London, no one had compassion enough
on me—a child of singular abilities, quick, eager, delicate,
and soon but, bodily or mentally—to suggest that some-
thing might have been spared, as certainly it might have
been, to place me at any common school. Our friends,
I take it, were tired out. No one made any sign. My
father and mother were quite satisfied. They could hardly
have been more so if I had been twenty years of age,
distinguished at a grammar school, and going to Cambridge.
And indeed, if his parents could have foreseen the future,
they would have had cause to be much more satisfied. For
when the fragile little boy was sent into his cousin's
blackening warehouse, he entered a better school, as it
happened, than his father could have chosen for him. It
was an infinitely more painful school than Harrow or Eton,
but for one whose destined work was to describe the poorer
houses and streets of London, and the many varieties of
life, odd and sad, laughter-moving and pathetically
sad, that swarmed in it, was a more instructive school, it
was the true road to knowledge. The chances were that a
delicate boy like him succumbed to his wretchedness, and
that a clever boy like him became a rogue and vagabond,
but he survived these dangers and became a great novelist.
Instead of sinking into the depths of the hurrying atoms,
he rose above them, or, kept apart from them, observed
them, and became their describer.

It is impossible to say how this watchful habit began,
and when it connected itself with his love of literary
dissection. We have Dickens's own testimony that it was
a singularly observant child, and that at a very early period
he had an ambition to become "a learned and distinguished
man," but it would be going too far to suppose that from
his childhood he held himself apart and kept a keen eye on
the doings of others with a view to making capital out of
his observations. At first in all likelihood the distinction
which he coveted was a kind of distinction that seemed to
him possible only through the medium of grammar-schools
and universities. To the last no doubt he regretted this
want of academic study, and believed that it had placed
him at a disadvantage. Still accident is so very much
too a schoolmaster than designer, that from the first it
gave him also the literary training needful to make him
a painter of manners. His father, the navy pay clerk, had
a small collection of books, with which the "very small and
not over-particularly taken care of boy" had made himself
familiar while he was living at Chatham, before his experience
in Camden Town and the blacking warehouse. Among these
books were Roderick Random, Peregrine Pickle, Humphrey
Clinker, Tom Jones, the Vicar of Wakefield, Dick Quaterly, Gil Blas, Robinson Crusoe, the
Robust Nuptials, Mrs Inchbald's Farces, and the Tales of
Gemi. This literature did not glide over the boy's mind like water
over marble; it found congenial soil, and fell into it as
seed. He lived the life of his favourite characters. "I have
been Tom Jones," he says, putting his own case into the
mouth of David Copperfield, "a child's Tom Jones, a
harmless creature), for a week together. I have sustained my own ideas of Roderick Random for a month at a stretch, I verily believe. I had a greedy relish for a few volumes of voyages and travels—I forget what now—that were on these shelves; and for days and days I can remember to have gone about my region, or house, armed with the cut-out pieces out of an old set of boot-trees, the perfect realization of Captain Somebody of the Royal British navy, in danger of being beset by savages, and resolved to sell his life as a great price. And then follows something still more suggestive, as showing his tendency to connect these ideal creations with the world of sense around him. "Every farm in the neighbourhood, every stone in the church, and every foot of the churchyard had some association of its own in my mind, connected with these books, and stood for some locality made famous in them. I have seen Tom Piper go climbing up the church steeple; I have watched Strap, with the knapsack on his back, stopping to rest himself upon the wicket gate; and I know that Commodore Trumnon held that club with Mr Pickle in the parlour of our little village alehouse. Even thus early, too, he tried to imitate what he read, wrote a tragedy founded on one of the Tales of the Genii, and acquired great fame in his own circle.

A boy with this preliminary training was excellently prepared for a course of strange and painful experiences. The bitter contrast between the ideal world in which he had lived, and the miserable poverty in which he spent the first three years of his life in London, making himself useful at home, running errands, carrying things to the pawn-brokers, visiting his father in the Marshalsea, into which the poor man and his family soon drifted, tying up pots of blacking at the warehouse, prowling about cook-shops, à-la-mode beef-shops, and coffee-shops, a shabbily clad and insufficiently fed little boy, seeking to invest his provision on the part of the great schoolmaster Accident; which he adopted from the nickname of one of his brothers. He wrote nine of these sketches for the Monthly Magazine, and then he was engaged to write some for an evening paper, and at last published as the first series of Sketches by Boz was collected and published in two volumes in the February of 1836, with illustrations by George Cruikshank. The first edition was exhausted in a few months; a second was called for in August. The Sketches had at once attracted attention. No wonder, for in them we find already in full swing the unflagging delight in pursuing the humorous side of a character, and the inexhaustible fertility in inventing ludicrous incidents, which had only to be displayed on a larger scale to place him once on a pinnacle of fame. There are many of them, such as the Parish, the Boarding House, Mr Minns and his Cousin, and the misplaced attachment of Mr John Dounce, which show Dickens's humour at its very richest. He had formed, too, by this time his characteristic likes and dislikes, and plays them off upon his butts and favourites with the utmost frankness. The delight in homely sociability and cheerfulness, in the innocent efforts of simple people to make merry, the kindly satire of their little vanities and ambitions, the hearty ridicule of dry flogies who shut themselves up in selfish cares and reserves, and of sour mischief-makers who take pleasure in conspiring against the enjoyment of their neighbours,—these tendencies, which remained with Dickens to the last, are strongly marked in the Sketches, though lighter-hearted in their expression than in his later works. The mark and indispensable condition of all great work is there, that which Mr Carlyle calls veracity—the description of what the writer himself has seen, heard, and felt, the fearless utterance of his own sentiments in his own way.

The first number of The Posthumous Papers of the
Pickwick Club was issued in April 1836. The story of its origin was first authentically told in the preface to the edition of 1847. Some of the details were afterwards slightly modified. The first thought of the work did not originate with Dickens, although the character of it was determined by him. The publishers, Messrs Chapman & Hall, and Mr Seymour the artist, had agreed to issue a monthly serial to be illustrated by Mr Seymour, and they went to Dickens, whose Sketches had attracted their attention, to propose that he should write the letterpress of this "monthly something." Their idea was that the author should describe the adventures of a "Nimrod Club," the members of which should go out shooting, fishing, and so forth, and getting themselves into difficulties through their want of dexterity. Dickens undertook the monthly something, but obtained the required diverting incidents by a different machinery, namely, the Pickwick Club. The first four numbers went off slowly; the demand first became "break" after the fifth number, in which Sam Weller made his appearance. But by the discerning few the value of the work was recognized, and one of them, Mr Bentley, who had published only a few weeks before fame came to the author with its capricious and overwhelming suddenness, engaged him to undertake the editing of a monthly magazine to be started the following January, and to write a serial story for it, and further made an agreement with him for the writing of two other tales at a specified early date. Of the vexation arising out of this agreement when the huge success of the Pickwick Papers showed its terms to be inadequate, and Dickens was disposed to resent it as a selling of himself into slavery, and of the manner in which the bargain was re-adjusted, an account is given by Mr Forster from the author's point of view. Nine monthly numbers of the Pickwick Papers were published in 1836, eleven more in 1837, by November of the latter year the sale had reached 40,000 copies, Pickwick had become a popular hero and godfather to innumerable articles of merchandise, and Sam Weller's sayings were catchwords in the street and language was spoken. It is necessary to receive a certain sum every week for what was written, and was besides to share half the profits with the publishers. When the scheme was agreed to by the publishers, he proceeded to release himself from other engagements by resigning the editorship of Bentley's Miscellany, and getting clear of his obligation to write Barnaby Rudge for Mr Bentley in consideration of his buying the copyright and stock of Oliver Twist for £2250. He thus started clear with Master Humphry's Clock, the title upon which he had tried. His characters were drawn from the experience of fame as the author of a tragedy, at the school in Morrington Place he and his companions mounted small theatres and acted small plays; when in the attorney's office in Lincoln's Inn Fields he frequented minor theatres, the nature of which he has caricatured in the Sketches, and not unfrequently engaged in parts; one of his first published sketches, "Mrs Joseph Porter Over the Way," is a description of private theatricals in a stage-struck family. In 1836, before his serial engagements multiplied, he wrote a farce called the Strange Gentleman, and a short comedy with songs called the Village Olympic. It is strange that with this passion for the stage, which he always retained, he should not have written more plays. He probably felt that in this kind of composition he had but the use of his left hand, and did not care to risk his reputation where he had no field for those powers of description and narrative over which he had no control. But though he did not write plays, and finally sought no outlet for his theatrical longings except in amateur acting and in reading from his own novels, the habit of realizing incidents as they would appear on the stage is unmistakably apparent in his work. He constantly seems to be working up scenes to the pitch of stage effect, elaborating the actions of his characters as if he were inventing "business" for a play, suggesting, in fact, an excess of business far beyond the capabilities of any human performer.

We doubt whether the fact that Dickens did not write plays is explained by saying that his genius was descriptive and narrative, but not dramatic. There is plenty of the raw material of dramatic action in his dialogues. He probably could have written a good acting play if he had tried. His characters are essentially theatrical, though their story is told according to the laws of the novel, and not according to the laws of the drama. The explanation of his not having tried to write plays we take to be simply that he discovered full employment for his powers in another direction before he had applied himself to the art of constructing plays. Dickens was eminently a practical man, and, when publishers were fighting for his novels, he directed his whole energy to meeting the demand without seeking to experiment on other modes of composition. As some compensation to Mr Bentley for releasing him from the strict terms of the agreement we have mentioned, he edited a life of Grimaldi, which was published in 1838; but after that he put his whole strength into the art of writing sketches and serial tales. As soon as Pickwick was off his hands, and before Oliver Twist was yet completed, he made an agreement with Chapman & Hall to write a new work, the title whereof should be determined by him, of a similar character and of the same extent as the Posthumous Papers of the Pickwick Club, and between April 1838 and October 1839 he produced the Life and Adventures of Nicholas Nickleby. Before the end of the serial publication of Nickleby, he had conceived a new project, partly with a view to relief from the strain of writing a continuous story in instalments, where he paid at his heels, and partly with a view to getting more profit for himself out of his labours. This was a weekly publication, to be edited by himself, and to contain sketches, essays, tales, adventures, and letters from imaginary correspondents. He was to receive a certain sum every week for what was written, and was besides to share half the profits with the publishers. When the scheme was agreed to by the publishers, he proceeded to release himself from other engagements by resigning the editorship of Bentley's Miscellany, and getting clear of his obligation to write Barnaby Rudge for Mr Bentley in consideration of his buying the copyright and stock of Oliver Twist for £2250. He thus started clear with Master Humphry's Clock, the title upon which he had tried. His characters were drawn from the experience of fame as the author of a tragedy, at the school in Morrington Place he and his companions mounted small theatres and acted small plays; when in the attorney's office in Lincoln's Inn Fields he frequented minor theatres, the nature of which he has caricatured in the Sketches, and not unfrequently engaged in parts; one of his first published sketches, "Mrs Joseph Porter Over the Way," is a description of private theatricals in a stage-struck family. In 1836, before his serial engagements multiplied, he wrote a farce called the Strange Gentleman, and a short comedy with songs called the Village Olympic. It is strange that with this passion for the stage, which he always retained, he should not have written more plays. He probably felt that in this kind of composition he had but the use of his left hand, and did not care to risk his reputation where he had no field for those powers of description and narrative over which he had no control. But though he did not write plays, and finally sought no outlet for his theatrical longings except in amateur acting and in reading from his own novels, the habit of realizing incidents as they would appear on the stage is unmistakably apparent in his work. He constantly seems to be working up scenes to the pitch of stage effect, elaborating the actions of his characters as if he were inventing "business" for a play, suggesting, in fact, an excess of business far beyond the capabilities of any human performer.
Dickens

unest possible freedom of action. Of course, when we say that this explains his method, we do not mean that it accounts for his success; we do not mean to detract from the marvellous genius that enabled him to write with success under such conditions. We are only concerned to show how the kind of plot that he adopted, and the numerous branches, sub-plots, and meanderings which he permitted himself were imposed upon him by circumstances of publication and composition,—were, in fact, necessary to success under those circumstances. A great deal too much has been made of the want of plot in Dickens's novels, as if it were a weakness, as if he had been incapable of constructing a plot,—the truth being that his method was deliberately adopted as that best suited to the position in which he found himself. It is evident that he was very much exercised over this question of plot, as indeed he was on all points touching his art. The Pickwick Papers may be put on one side in studying the question, because the author, when writing it, was not thinking in the beginning of the necessity of plot; he himself explained, “I was not invented;” they were simply “designed for the introduction of diverting characters and incidents.” In his subsequent novels, if the Pickwick Papers can be called a novel, he could lay his plans beforehand, and consider how far it was possible to reconcile the introduction of interesting characters and incidents with greater regularity of structure, and he never seems to have solved the problem to his own satisfaction. In Oliver Twist he adopted the method of Defoe, and wrote what may be called a biographical novel, the hero of which is involved in a series of complications, arising one after another without being foreseen and calculated for from the beginning. In this way he avoided committing himself too far in advance to engagements which might afterwards prove embarrassing, the tools are laid for Oliver and cleared away more than once in the course of the story. In Nicholas Nickleby he reserved similar freedom of action by making Ralph conspire to ruin his brother's children without committing himself at the outset to any particular scheme as the villain's one resource; he thus also makes provision for a series of plots, one after another, and secures a certain unity for the whole by making them all proceed from one malevolent agency, whose motive was formed before the story began. In Nicholas Nickleby, however, he departs from certain restraints under which he had held himself in the construction of Oliver Twist; he asserts greater freedom from the bis and bridle of plot in his introduction of diverting incidents which have no proper connection with the main story. Miss La Creavy and the Kenwigges are brought in on the slightest of pretexts, slightly even than that which serves for the introduction of the Mantalins and the Crummles family. But no one can quarrel with a breadth of canvas which the author is able to fill with such figures; the critic can only say that he would have made a mistake if he had limited himself from the scope thereby given for his powers. As in Notes into Writing them; “of integrity is the main alone humour of Ralph, so in the Old Curiosity Shop the moving principle is the malevolent humour of Daniel Quilp. It is characteristic of Dickens that the uncalculating impulses should have so much influence in the direction of his stories. Fagin has some amount of selfish object in his designs against Oliver Twist; but Ralph and Quilp have nothing to gain by their conspiracies except the gratification of pure malice. The counter-agencies to these simple incarnations of the devil are equally disinterested. Oliver's good angel Nancy, Kate Nickleby's Newman Noggs, Little Nell's Kit, and Kit's Dick Swiveller are swayed by impulses of pure generosity. Observe, too, the analogous position of Mr. Brownlow the protector of Oliver, the Cheeryble brothers the protectors of Nicholas, and Mr. Garland the protector of Kit. It is a game between the elementary passions, in which the good triumphs.

Master Humphrey's Clock was allowed to run out in November 1841, with the conclusion of the tale of Barnaby Rudge, which followed the Old Curiosity Shop. The construction of Barnaby Rudge is less simple than that of any of its predecessors, Dickens here attempted a more closely knotted form of plot. There are no incidental diversions in this novel, all the characters have some finger in the main story, and every scene tends towards the development of some relation which afterwards has a potent influence on the course of the main events. It is true the Lord George Gordon riots fill so much space as to eclipse for a time the private interests of the novel; but the lives of all the personages whose fortunes we are following are interwoven with the public history with the most elaborate care and consummate skill, and when our fears for the commonwealth in the general storm are allayed, the keenest interest is left for the fates of the individuals that have been involved in the commotion.

Barnaby Rudge cost the author much labour, and after finishing it, and with it Master Humphrey's Clock, he felt the need of some change of strain. He had begun to chafe under the weekly form of publication, and fret as to what he might have done with Barnaby if he could only have produced it in monthly instalments. This determined him to make an agreement with his publishers for the issue of his next story in the old monthly form. When he projected the Clock, one of his schemes was that he should visit Ireland or America, and write from there a series of descriptive papers for it. The Clock was discontinued, but the desire to seek fresh fields remained. He accordingly set out for America in January 1842, returning in June, after a reception which might well have turned his head, to write the American Notes. He had been run after and stared at by crowds, and cheered with greater enthusiasm than if he had been a crowned potentate; and the people of the United States complained that in those Notes, as well as in his fierce endeavours to enlighten them on the subject of copyright, he had made but a poor return for their welcome. He was superfluously aggressive, there is no doubt; but they freely forgave him when he returned some years afterwards.

From whatever cause, the sale of the first number of Martin Chuzzlewit (January 1843), in which he returned to the broad and free method of Nickleby, only seeking a new motive for his plot in the design of a severe but benevolent old uncle for his nephew's reformation, and the schemes of a pious hypocrite, fell considerably below what he had been led to expect by the sale of his former monthly. Only 20,000 were sold; his publishers, with whom he had made a very advantageous bargain, irritated him by grumbling; and though the novel obtained still higher praise than any of its predecessors, he was disappointed and discontented, and began to resolve other plans for making living by his pen. He conceived the idea of writing a Christmas tale, the Christmas Carol; but he made much less profit by the enterprise than he made by similar tales afterwards, when he charged less for them and appealed to a wider audience. Although he sacrificed nothing of his individuality in the substance of the tale, and it was no failure in point of reputation, the pecuniary side of the work was for the moment uppermost in his mind, for, large as his income had been, he had exceeded it, and the most popular author of his time was suffering horrors, as he himself said, of "intolerable anxiety and disappointment." This disappointment determined him to live abroad for a time, partly to reduce his expenses, and partly to store his mind with fresh material. He settled at Genoa, and there finished Chuzzlewit, and wrote the Chimes, his Christmas
tale for 1844, making a brief visit to England to read it to a party of friends and arrange for its publication. He visited the principal towns of Italy in the first months of 1845, returning to England by way of Switzerland in June.

His first work on returning to London was to project a new weekly, to be called the Cricket, "price three halfpence, if possible—partly original, partly select, notices of books, notices of theatres, notices of all good things, notices of all bad ones; carol philosophy, cheerful views, sharp anatomization of humbug, jolly good temper, papers always in season, put to the time of year; and a vein of glowing, hearty, generous, martial, beaming reference in everything to home and friends." The scheme for the time fell through. "About the same time he "opened communications with a leading member of the Government to ascertain what chances there might be for his appointment, upon due qualification, to the paid magistracy of London, but the reply did not give him encouragement to entertain the notion further. So he went to London, took the editorship of a new daily paper, the Daily News, and consented."

But a fortnight's experience (from January 21 to February 9, 1846) satisfied him that he was out of his element. He then resolved to go abroad again, and write another novel in shifting monthly numbers. The fruit of this resolution was Dombey and Son, the first number of which was issued in October 1846, and the last in April 1848. On resigning the editorship of the Daily News, he did not wholly part connection with it; he continued in it from January to March 1846 a series of descriptive letters, which he afterwards published under the title of Pictures from Italy. The sale of Dombey, which reached 32,000, reassured him in the pursuit of his special calling. He followed it up in 1849 and 1850 with David Copperfield.

There is not much room for variety of incident in the life of a novelist securely established in popular favour, working hard, and happy in the exercise of his art. When we have mentioned that Bleak House appeared in monthly numbers, from March 1852 to September 1853, Little Dorrit from December 1855 to June 1857, Our Mutual Friend from May 1856 to November 1856, we have given the chief incidents in the later half of the literary life of Dickens. He was much too restless a man, however, to settle down into a steady routine of work. He was not content to appear before the public only in monthly numbers. He stuck steadily enough to work in which he had proved his mastery, but yet he had always a craving for new experiences, and was always planning new enterprises. While David Copperfield was still upon his hands he returned to his old notion of a weekly periodical. At first he thought of calling it The Shadow, making it contain, as it were, the observations of "a kind of semi-omniscient, omnipresent, intangible creature," which should go into any place, by sunlight, moonlight, starlight, firelight, candlelight, and be in all houses, and all nooks and corners, and be supposed to be cognizant of everything, and go everywhere, without the least difficulty, which might be in the room of Commons, the prisons, the unions, the churches, on the railroad, on the sea, abroad, and at home."

But on consideration he abandoned this idea, and chose the title Household Words. The first number appeared in March 1850. In Household Words, besides contributing short stories to the annual Christmas number, Dickens wrote Hard Times between April 1 and August 12, 1854. In 1859, in consequence of a quarrel between the editor and the publishers, Household Words was discontinued, and All the Year Round, practically the same periodical under a new title, took its place. All the Year Round, besides Christmas contributions, Dickens wrote A Tale of Two Cities between April 30 and November 26, 1859; the Uncommercial Traveller, between January 28 and October 13, 1860; and Great Expectations between December 1, 1860, and August 3, 1861. It is often made a question whether there was any connection between the later works of David Copperfield would generally be named as the novel in which his power was at its zenith. The question is not one that can be answered by an unqualifed yes or no. There is certainly no falling off in descriptive power. The idiom of his dialogue is finer; the work is perhaps keener and more swift. His characters are more sharply defined, the force with which they are drawn is more delicate. In no point of the novel's art, whether in the general construction or in the execution of details, is there any sign of failing power. On the contrary the power seems to have become firmer and more sure from practice. Does the fault then lie with the reader? Is it that we have grown tired of his volumes? This is probably but a part of the reason, but yet it is not to be denied that we miss something in the later works. We laugh less over the pages. There are longer "intervals" of seriousness. Humorous characters are still there in abundance, Joe Gargery, Old Boon, Will Swain, Sepulchre Crisparkle, Durdles, Mr. Sapsea, are as irrepressible as any of their predecessors. But on the whole there is less exuberance of annual spirits. The fun is not so unflagging. It is even less hearty, for there is mixed with our laughter something of contempt or pity for the object of it. Not that it is all laughter and undersigned diversion in any of the earlier works. Dickens belonged to a serious and moralizing generation, he came in with the Reform Bill, and partook largely of the moral spirit of its framers. Even in the joyous Pickwick Papers there is a serious blow at prison abuses. Oliver Twist is almost as didactic as one of Horace Mann's tales. Before writing Nicholas Nickleby he went down to Yorkshire like a Government commissioner to inquire into the abuses of the Yorkshire schools. Through all the fresh and boisterous fun of his earlier works, there was an almost declared doctrine that it is our duty to laugh, a sort of protest in favour of laughter, and a denunciation of the dismal as a curse.

The same genial doctrine runs also through his later works, but it is urged with a trace of bitterness, and with a greater sensivenessto the evil principles that oppose it. Dickens was not written out, but he was growing old, and the annual spirits which fed the flame of his marvellous humour began to show symptoms of exhaustion. The quality of his humour was unimpaired, but the quantity had suffered diminution.

Dickens established his first weekly periodical from a desire to draw closer the relations between himself and his readers. He drew those relations still closer in 1838, by beginning a series of public readings of his own works. He had long hungered for this way of giving body and substance to his feeling of success. He had always been eager for the immediate and palpable triumphs of the stage. The idea of taking a hall or theatre and reading from his own books was first mentioned by him in 1844, after he had read the Chimes to a small company in Mr. Forster's rooms, and he often returned to it, but was obliged to hold it in abeyance for fourteen years, his friends urging that it would be beneath his dignity. In 1858 his resolution was taken in spite of all the difficulties, and he began to escape from unreasonableness at home, though it may well be believed that his own temper—restless, irritable, and exacting in the midst of his work—was largely to blame for the discomfort from which he suffered. He gave four series of readings in 1858—59, 1861—2, 1866—7, and 1868—70, appearing in nearly every town of any size in the United Kingdom; and in 1867—68 renewing in this way his acquaintance with the Americans. The success of
these readings was enormous from every point of view. Mr. Forster mentions that he remitted from America £10,000 odd as the result of 34 readings.

That Dickens should so long have abstained from appearing as a public reader of his own works, and standing face to face with his audience to enjoy the delight of their applause, notwithstanding his strong desire to do so, is a significant fact. It gives a sort of measure of two things,—the force of his craving for sympathy and applause, and the extent of his patience under conventional prejudices. It was from deference to these prejudices that he abstained; and it required an almost fierce effort on his part to dismiss those prejudices as "humbug," and "the proprieties of old women." His attitude towards society, in the narrow sense of the word, was always peculiar. To understand it, we must bear in mind the circumstances of his youth. He seems never to have quite lost a lurking fear that those circumstances exposed him to contempt. It is perhaps for this reason that Dickens so often treated the new generation of writers as a gentleman, and made it clear to such a fact; but it clung to him, and was always demanding a certain struggle to keep it down. Slight as the struggle was, the traces of it are perceptible in his work. We have an evidence of it in the common saying that he never succeeded in painting "a gentleman." That is not to be got over by calling for a definition of the word; it is a popular expression of a fact, the fact that nearly all the personages in his novels occupying a position in life to which that word would have been applied in his own time are painted in unfavourable colours. Perhaps the course of his stories did not call upon him to pant more favourable specemens of that class; still the fact remains that in Dickens's attitude towards society there was something of the defensive, even of the aggressive. He faced towards society with a certain air of defiance, with the consciousness of a vast popular multitude behind him, to which he could appeal if they refused him what was due. He never claimed more than his due, and it was never refused to him. It is perhaps for this reason that the traces of his spirit of revolt against society are so slight as to be more matter of inference than of observation. It is more correct to say that he never tried to paint "a gentleman," than that he did not succeed. The question can hardly be raised without giving it undue importance, an importance which Dickens himself would have been the first to make it of; for, though he had his full share of the little vanities inseparable from humanity, he was a great man in temper as well as in genius, and littlenesses were of the accidents and not of the essence of his nature.

Dickens's want of perfect sympathy with the cultured society of his time incapacitated him for that kind of novel which answers to comedy in dramatic composition, although it left him free for work of a greater and more enduring kind. What may be called the comedy novel, the novel of Thackeray in Dickens's generation, is much less sure of enduring fame, because the sentiments on which it rests, being an aspect of a particular heart and mind, are more fugitive, and pass sooner into the province of the historian. The novels of Dickens will live longer because they take hold of the permanent and universal sentiments of the race,—sentiments which pervade all classes, and which no culture can ever eradicate. His fun may be too licentious for the refined tastes of his own time, or, for the matter of that, of posterity; his pathos may appear maudlin; but they carried everything before them when they first burst upon our literature, because, however much exaggerated, they were exaggerations of what our race feels in its inner heart; and unless culture in the future works a miracle, and carries its changes beneath the surface, we may be certain that Dickens will claim his hold.

If Dickens had been asked why his novels were likely to live, he would probably have answered that it was because he put more work into them than any of his contemporaries. He was fond of insisting that genius meant attention. The definition may be accepted with a qualification. No man can become a genius by resolving to attend; but if he attends very much in some one direction by natural impulse, then he may be said to have become a genius, whatever may be his field of work. No genius is of much avail for great literary productions without attention. Dickens could never have gathered together his amazing variety of characters and abundance of incidents without attention. M. Taine, in his criticism of Dickens, dwells much upon the boundless wealth of his imagination; Dickens himself would have expressed the same fact by speaking of the persistence and closeness of his attention. It comes to the same thing in the end, whichever way we express it; but there is no doubt that Dickens's own expression is more descriptive of his actual method of work. M. Taine rather gives us the notion that Dickens should have been more industrial, than of his imagination; whereas, ready and active as his imagination ever was, he accumulated materials for it with the industry of a pre-Raphaelite painter. The charm, the inimitable secret, lay, of course, in the transmuting process through which dry facts passed in his imagination; but he laboured earnestly, exercised the most painstaking attention, not merely in bringing his facts together, but in setting them, with all their superadded value, for his special purposes. Dickens would have been a humorist though he had never written a line; he could never have helped attending to the humorous side of whatever met his eye; but without the attention on which he prided himself as the secret of his power, he could never have established himself securely as one of the greatest humorists in literature.

Our Mutual Friend was published in 1864 and 1865. After an interval of five years, during which he contributed to three Christmas numbers of All the Year Round, and wrote A Holiday Romance and George Silverman's Explanation for an American publisher, the first number of The Mystery of Edwin Drood was issued in April 1870. He did not live to complete the novel. For some years severe pains in the left hand and foot had given warning that he was overtaxing his system, but the warning was not fully understood till too late. He was suddenly overcome by a stupor, caused by effusion on the brain, on the evening of the 8th of June, and ceased to breathe on the following day. In his will he had desired that he should be buried in "an inexpensive, unostentatious, and strictly private manner, without any public announcement of the time or place of his burial." These conditions were observed; but his executors did not consider them inconsistent with his receiving the honour of interment in Westminster Abbey, where he was buried on the 14th of June 1870.

His death took place at Gadshill Place, a house near the main road between Rochester and Gravesend, which he had bought in 1856, and which had been his home since 1859. Here he worked, and walked, and saw his friends, and was loved and almost worshipped by his poorer neighbours for miles around. His previous residences in London had been Furnivals Inn, where fame found him a young man writing sketches for the Chromo; 40 Doughty Street, after his marriage and first flush of success; Devonshire Terrace, from 1839 to 1851; Tavistock House, from 1851 to 1859. These residences were varied by his numerous excursions to provincial towns, to the Continent, to America. But "perhaps there was never a man who changed places so much and habits so little. He was always methodical and regular, and passed his life from day to day, divided for the most part between working..."
and walking, the same wherever he was." It is a notable feature in his regularity that it was never a compliant routine; it was persisted in spite of restless longings which he never conquered to the last.

The authorized life of Dickens is that by John Forster, 3 vols 1871–2–4. There are two books on his public readings—Charles Dickens as a Reader, by Mr C. Kent, and Pen Photographs of His Readings in America, by Miss Kate Field. Mr G. A. Sala has published a valuable essay on his "Genius and Character." (W't)

DICOIYLEDONS. See BOTANY, vol ir. p. 92, &c., and VEGETABLE KINGDOM.

DICTATOR, the highest extraordinary magistrate of the ancient Roman republic. The original name of this office was magister populi, by which appellation he was called in the sacred books down to the latest times of the commonwealth.

When the republican form of government was established at Rome, and the supreme executive vested in the two consuls, emergencies sometimes occurred in which it seemed that the safety of the state might advantageously be intrusted for the time to some one man, whose past life had gained for him the esteem and respect of the whole body of the citizens. The idea of this office was borrowed by the Romans from the constitution of some of the Latin towns which they had subdued. It lay with the senate to decide when the services of a dictator were necessary. The power of nominating a man to the office was by that body made over to one of the consuls. It is not exactly determined to which of these officers the nomination of a dictator properly appertained.

The insignia of the dictator's office were—first, the lictors, twenty-four in number, who bore the fasces and fasces; second, the curule chair; and third, the toga praetexta.

The first dictator was appointed at Rome 501 B.C. nine years after the expulsion of the Tarquins. Who the first dictator was is differently stated by different historians, but it is most probable that it was T. Lartius.

Dictators were generally appointed to conduct a foreign war, but it often happened that in matters of less importance they were appointed with nominal authority. The dictator was generally selected in the absence of the consuls to perform some small ceremonies, which in strict propriety could only be gone through by one of the consuls. Thus he was sometimes chosen to hold the comitia, to appoint holidays, to affix the claurus annulis in the temple of Jupiter, and to preside at trials. As soon as the dictator was appointed, he was required to select a master of the horse (magister equitum), whose term of office was the same as his own.

The power of the dictator was absolute; and so long as he remained in office no appeal was open against his mandates to any other authority in the state. He was nearly altogether independent of the senate. He could inflict much severer punishments than the consuls without being hable, as these officers were, to have his sentence reversed by the assembly of the people. His power was as irresponsible as it was absolute. In token of the absolute power of the dictators over the lives of their fellow-citizens, their lictors bore the axe in the midst of the fasces, even in their walks through the city—a mark of distinction which the consuls had formerly enjoyed, but which had been abolished in their case by the Valenan law.

Though the power of the dictator was thus great, it was nevertheless limited by certain indirect restrictions. The most important of these was, that he had no control whatever over the public money, and had to content himself with such sums as were allowed him by the senate. He was not allowed to leave Italy; and could not appear on horseback in the city without the express permission of the people. The surest safeguard, however, against any treacherous designs on the part of the dictator was the shortness of the period during which he remained in office.

This was never permitted to exceed six months.

When a dictator was appointed, all the ordinary magistrates ceased to be directly responsible to the governing authorities of the state, and took their orders directly from him. The only magistrates exempt from this necessity were the tribunes of the commons. The inferior officers, however, did not, as has been supposed, retire from office altogether. They merely obeyed the dictator so long as he continued in power and on his resignation entered once more upon the untrammelled exercise of their authority.

It remains to be added that dictators were only appointed at Rome so long as Italy remained unsubdued. The last dictator appointed at Rome held office in 202 B.C.; from that time the constitutional dictatorship disappears from Roman history.

See Mommsen's Romische Staatsrecht, i. 1.

D IC T I O N A R Y

A LTHOUGH dictionaries are so numerous, so well known, and so much used, they vary so greatly in the nature and treatment of their subjects that any definition must be very much modified in order to include some works so entitled and usually so called. In its proper and most usual meaning, a dictionary is a book containing a collection of the words of a language, dialect, or subject, arranged alphabetically or in some other definite order, and with explanations in the same or some other language. What is essential is, that the words given should be the most of those belonging to the subject of the dictionary, or at least be very many in number, and that they should be arranged in definite order, and accompanied with interpretations. Many other characters may rightly and advantageously belong to a dictionary, but these are the essentials. When the words are few in number, being only a small part of those belonging to the subject, or when they are given without explanation, or some only are explained, or the explanations are partial, the work is called a vocabulary. An alphabetical arrangement of the words of some book or author with references to the places where they occur is called an index. When under each word the phrases containing it are added to the references, the work is called a concordance. Sometimes, however, these names are given to true dictionaries; thus the great Italian dictionary of the Academy of La Crusca, in six volumes folio, is called Vocabolario, and Erasing's dictionary to Ciceron is called Index. When the words are arranged according to a definite system of classification under heads and subdivisions, according to their nature or meaning, the book is usually called a classed vocabulary; but when sufficient explanations are given, it is often accepted as a dictionary, like the Onomasticon of Julius Pollux, or the native dictionaries of Sanskrit, Manicha, and many other languages. Dictionaries were originally books of references expanding the words of a language or of some part of it. As the names of things, as well as those of persons and places, are words, and often require explanation even more than other classes of words, they were necessarily included in dictionaries, and often to a very great extent. In time, books were devoted to them alone, and were limited to special
subiects, and these have so multiplied, that dictionaries of things now rival in number and variety those of words or of languages, while they often far surpass them in bulk. There are dictionaries of biography and history, real and fictitious, general and special, relating to men of all countries, characters, and professions; dictionaries of geography, relating to all books, or to those of some particular kind or country; dictionaries of geography, of the whole world, of particular countries, or of small districts, of towns and of villages, of castles, monasteries, and other buildings. There are dictionaries of philosophy; of mathematics; of natural history, zoology, botany; of birds, trees, plants, and flowers; of chemistry, geology, and mineralogy; of architecture, painting, and music; of medicine, surgery, anatomy, pathology, and physiology; of diplomacy; of law, canon, civil, statutory, and criminal; of political and social sciences; of agriculture, rural economy, and gardening; of commerce, navigation, horsemanship, and the military art; of mechanics, machines, and the manual arts. There are dictionaries of antiquities, of chronology, of dates, of genealogy, of heraldry, of dialectics, of abbreviations, of useful receipts, of monograms, of adulterations, and of very many other subjects. And lastly, there are dictionaries of the arts and sciences, and their comprehensive offspring, encyclopaedias, which include in themselves every branch of knowledge. The tendency of dictionaries of language is to increase the vocabulary, to multiply articles; the tendencies of dictionaries of things, and especially of encyclopaedias, is to diminish the number of articles, fusing subjects together as far as possible, and to develop the explanation, making it longer and more copious and circumstantial. This does away with the necessity of turning to many articles scattered through all parts of the work for a complete view of a subject. On the other hand, as requiring an index, it is less convenient for frequent reference on minor points.

**Dictionarium** is a word of low or modern Latinity; **dictio**, from which it was formed, was used in medieval Latin to mean a word. Lexicon is a corresponding word of Greek origin, meaning a book of or for words—a dictionary. A glossary is properly a collection of unusual or foreign words requiring explanation. It is the name frequently given to English dictionaries of dialects, which the compilers usually call idioms, and the Italian vocabolario. Wörterbuch, a book of words, was first used among the Germans according to Grumm, by Kramer (1719), imitated from the Dutch woordenboek. From the Germans the Swedes and Danes adopted ordboek, ordbog. The Icelandic ordáld, like the German, contains the genitive plural. The Slavonic nations use slovar, slovnik, and the Southern Slaves rytshnik, from slovo, rytsh, a word, formed, like dictionary and lexicon, without composition. Many other names have been given to dictionaries, as thesaurus, Sprachschatz, corneaeopou, gaza-phylist, comprehensuror, collogio, to indicate their completeness, manipus praedactum, promontorium ponticum, libri memorialis, hortus vocabulorum, pharetra (a violet bed), alveary (a beehive), kamoos (the sea), hast kulsrum (the seven seas), taze tria (a standard of character), onomasticon, nomenclator, bibliotheca, eluci-

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1. Joannes de Garlandis, who probably was born about 1275, and died about 1320, gives the following explanation in his *Dictionarius*, which is a classed vocabulary. "*Dictionarius dicitur libellus de dictionibus magnis necessitas, quas tantum subtletatem scolarum, non solum汉字, serva de lipsis facto, sed et curiae armour)e, scilicet rerum usque ad "Thus has been supposed to be the first use of the word.

2. An excellent dictionary of quotations, perhaps the first of the kind, a large folio volume printed in Ratisbon about 1475, in German, compiled by Eucharius and Julius von Mosbach, is Cruca from the great Italian dictionary, and Calepino (in Spanish and Italian) from the Latin dictionary of Calepinus.

A dictionary of language should contain all the words which may be reasonably looked for in it, so arranged as to be readily and surely found, and so explained as to make their meaning as possible their use, clear to those who have a competent knowledge of the language or languages in which the explanations are given. Some dictionaries may suppose a very considerable degree of knowledge in those who use them, but though one could not be written which would make every word clear to a young child, they should in general be as easy and simple as possible. A full and complete dictionary of a great literary language can be compiled only by great labour, patience, knowledge, and skill, employed for many years in collecting, correcting, adjusting, and completing the labours of many previous generations of workers. Such a dictionary should include all the words of the language, but to present it with all and for a complete dictionary should be the complete record and picture, or, as Archbishop Trench says, the inventory of language. It must contain all words ever in any way belonging to it, in writing or in speech, or it will not be a complete record, and will not satisfy those who consult it. Lexicographers have too often tried to exercise a choice, and not content with being recorders, have made themselves judges of words, and refiners and improvers of language, and have attempted not only to reform the language, but to check it in that growth and development which is inherent in all living tongues, and to make their dictionaries standards and rules of language, rather than representations of the language. Unfortunately, this error is echoed by popular opinion; and a standard dictionary is too often supposed to be an arbiter of words, rather than a standard of excellence among dictionaries. The intention of the author should be, as Bescherelle says, not to reform the language, but to present it with all and its caprices, anomalies, irregularities, beauties, defects,—in a word, as the nation has made it. The precise value or worthlessness of a word can only be marked when it is admitted. If not found in the dictionary, it may be supposed to have been unknown to the author, as there is nothing to show that it has been condemned and rejected. The French Academy at first rejected all technical terms, but was compelled by popular clamour and the success of Furet's dictionary, in which very many were given, to admit them in increasing numbers in its second and all subsequent editions. It is the more necessary that they should not be excluded, as the meanings are difficult to learn, and are most often looked for; and a dictionary intended for general use, should, as it should, include the words belonging to every profession.Obsolete words are admitted by Johnson, Litttré, and other first-rate lexicographers, only when they have remained in use entitled *Pharetra* ancipontes et dacta doctorum, philosophorum, et postorum continuo.*
DICTIONARY

French words evidently attached to it by community of ideas, or by relations of habitual use, cause, means, effect, or any analogy whatever. This part, he says, shows how to call things by their right names, and, as he remarks, great care is taken to teach children grammar, but none to teach them words. In the upper part of each page he gives all the words in alphabetical order, with a reference to the group in which each will be found. Roget, in his Thesaurus, gives under each head (1000 in number) not only the words belonging to the idea, but their opposites, and adds at the end of the book an index of all the words. This system, on account of its very great use and value, might well be made a subsidiary part of a standard dictionary, the groups being, placed in the general alphabet, and a reference to each group being added to each word. The arrangement by terminations is of use grammatically and etymologically, and for making verses, but care must be taken that the beginning is illegible or wanting. A dictionary of rhymes is similar, but not exactly the same, and is of little use except for making verses, and, when the rhymes are perfect, for showing the pronunciation. In the Semitic languages words are commonly placed under their roots, and in MS. lexicons the roots are often arranged alphabetically, according to the last radical. When Lane was making his great Arabelle lexicon, he generally had before him eight or ten native lexicons, containing three different arrangements of roots. In Chinese dictionaries the characters are usually arranged under the 214 radicals, which now serve as an alphabet. In former times the number varied, and was much greater. The characters under each radical are further subdivided according to the number of strokes used in making each character, in addition to its radical, or the abbreviation of its radical which each character contains. But no arrangement is attempted of the characters having the same number of strokes. Other systems are sometimes used, arranged by tones and endings, and by the characters (about 1040) called phonetics.

In the separate articles of a dictionary the arrangement must vary very much with the language, as well as with the word itself. When necessary, the orthography, pronunciation, and grammatical inflections of the word should be given, and any variations of these at different times and places carefully pointed out, as well as the character of the word, such as obsolete, provincial, &c., and forms beginning with a different spelling should be placed in separate articles, with references to the main article. The etymology should be given, referring derivatives to their respective roots, and under each root giving, if not the derivation as far back as it can be traced, at least what Lattre calls the secondary etymology—that is, deriving it from a word not belonging to the language, as when a French word is traced to a Latin or German word without proceeding farther; and cognate words should generally be enumerated, often with their principal meanings. This gives a primary meaning, but care must be taken that the derivation is a real one, not a mere fancy or guess. The times when the word was introduced or became obsolete should be noted, and the meaning it bore at first, as well as those which prevailed at various periods. The meanings may be arranged in a series, not merely as they may be imagined to have been logically developed from each other, but as their connection may be traced, and can be shown to have existed in actual use, and where this connection cannot be traced, the defect should be pointed out. Sometimes, too, the meanings are, as Johnson says, collateral. In some kinds of dictionaries the order of arrangement is alphabetical, with the sections arranged alphabetically, and resembles in its verses the classified

after a certain period. Richardson gives only those useful for etymology, which is Lattre's rule for patois. Grimm admits all words at any time belonging to High German or its dialects. The great German dictionaries generally admit dialects, and in this respect are more complete than the French and English. The Chinese give in their standard dictionaries every character known to exist, though many are erroneous, corrupt, vulgar, or local, or are merely improvements proposed by some eminent person. Of the ancient characters, sometimes the pronunciation, and occasionally the meaning, are unknown, while both are known in some cases completely lost. Johnson omits all words relating to proper names, but they, as well as proper names, often as really belong to a language as any other words. The Philological Society propose that their new dictionary of English, begun in 1836, shall contain "every word occurring in the literature of the language," and "admit as author's work all English books," unwisely excepting "such as are devoted to purely scientific subjects, as treaties on electricity, mathematics," &c., beginning "with that definite appearance of an English type of language distinct from the preceding semi-Saxon," about the year 1250. Their vocabulary of words beginning with the letter B, printed in 1863, contains 17,729. The practice of universal admission of words is becoming more generally adopted in standard dictionaries of all languages. Words can be most surely and quickly found when arranged alphabetically in a single series. Other arrangements, though sometimes more useful, are not so generally convenient. When it is thought desirable to separate any class of words, they should still be also inserted in their proper places in the general alphabet. In a large dictionary a small separate additional alphabet is almost lost, and is usually overlooked by searchers. According to Grimm, the alphabetical arrangement not only facilitates reference, but makes the author's work quicker and surer, "for he who would insert rich contributions must have the places for them before his eyes, and not have to search about undecidedly to find whether the word is already there or not." The order of the alphabet should be that commonly used in the language. Any other makes reference more slow and uncertain. Grimm says that the order of the Sanskrit alphabet, adopted by Diefenbach and others, brings confusion rather than light to European languages. The etymological arrangement under roots has been generally condemned by experience. It places all words of the same origin together, so that they can be at once seen, which is often very useful and important, and is a great help in learning a language, as it amounts to memory. But a word not belonging to the small number of roots cannot be found unless its root is known; otherwise it must be looked for in the index, or if there is none, sought for by guess-work in many places. And as etymologies will vary according to fancy or knowledge in the word, as Grimm says, will be sure of its place, and no arrangement is more destructive of the object and use of a dictionary. All its advantages may be secured by giving under each root a list of derivatives. Another system, more rarely adopted, though perhaps more useful, is that of arranging all words under their leading ideas, so that all those relating to a subject are seen together, and the proper word to express an idea may be found almost as easily as the idea expressed by a word may be found in an ordinary dictionary. It is, in fact, a classified vocabulary of all the words of the language, with the sections arranged alphabetically, and resembles in its verses the classified
and complete explanations of all the meanings, and again, as is necessary in a complete dictionary, may include usage. The explanations of the meanings should be precise, not vague, real definitions and not a mere reference of one word to another of the same meaning, as when the French Academy explains fier by hautauss, altier, and hautain by fier, orgueilleux. But when one language is explained by another, nothing conveys the meaning so well as a perfectly equivalent word. The interpretation of a language by itself is often very difficult, for there is no other word to express the idea, and simple ideas cannot be described. Therefore, in Grimm's dictionary Latin and other languages are used when necessary. Synonyms and homonyms should be given, as well as words of opposite meaning, and their similarities and differences explained. Remarks should be made on difficulties, faults to be avoided, peculiar constructions, figurative, idiomatic, and proverbial expressions, and the origin of these given when possible. All this should be done in the fewest and plainest words. Eloquence is out of place in a dictionary; but the author must not fear fulness when it is necessary, and must not allow brevity to make him obscure. A complete dictionary of a cognate language must necessarily be a very large book, but much space may be saved by the use of well-selected terms and abbreviations, and by typographical arrangements.

Examples form a very important part of a dictionary, but one which is generally omitted, often neglected, and seldom so carefully attended to as it deserves. When no quotations are given, the whole language depends on the authority of the author of the dictionary. The French Academy have always claimed the right of making their own examples. Voltaire says they seem to have made a law not to quote, but, he adds, a dictionary without quotations is a skeleton. Examples may be arranged either under the meanings they illustrate, which is the usual and most useful plan, or, in languages possessing an extensive literature of long duration, chronologically in one series, as the Philological Society formerly proposed. Littré has adopted a medium, and gives examples from authors of the 1st, 18th, and 19th centuries under the meanings to which they belong, and those from previous authors in a chronological series. Each quotation should give a complete sense, and not be a mere fragment of a sentence. It should, if possible, be instructive and interesting in itself, but should not occupy too much account be made too long. Those containing etymologies, definitions, or explanations of a word, as well as those in which it is joined to words of the same or opposite meaning, and those which mark its introduction or discourse, and those in which it is used as a foreign word not yet naturalized, should be especially sought. Each should have as exact a reference as possible. The common practice of giving only the author's name makes it sometimes impossible to verify a quotation without searching through his entire works, which may fill many volumes. In the case of some rare words, when the quotation would add nothing to the information otherwise given, the mere reference may suffice. The value of a dictionary and the richness of its vocabulary depend very much on the carefulness and extent of the search for examples, which can only be complete when it has extended to the whole literature of the language. If concordances and full indexes were more universal, the search for examples would be much facilitated. The foundation of the Philological Society's intended dictionary was to have been the transcribing of all English books not purely scientific for examples by volunteers. In October 1864, 1149 had been read, and 360 were in hand.

Though complete dictionaries of a language are very few,
DICTIONARY
Under either system, Arabic, Penian, and Turkish whose
dictIOnaries are 80 closely connected, would be' widely
separated. A wholly geographical arrangement would be
inc?nveDient, especially in Europe. Any system, however,
whICh attempts to arrange In a consecutive senes the great
network of languages by which the whole world is
enclosed, must be open to some obJectIOns' and the
arrangement adopted In this ~t has prod~ced some
anomalies and dispersions which might cause inconvenience If not pointed out. The old Italic languaues are
placed under atm, all dialects of France under French
(but Proven~al as a distmct language), and Wallachlan
among Romamc languages. Low German and Its dialects
are not separated from High German. B.lsque 18 placed
after Celtic; Albaman, GIPSY, and TurkISh at the end of
Europe. the last bemg thus separated from Its dialects
and congeners In Northern and Central Asia. among which
are placed the Kazan dialect of Tartar Samoyed and
Ostiak. Accadian IS placed after AssY~lan among the
Semitic languages, and Maltese as a dialect of Arabic'
while the Ethiopic is among African languages. as it
seemed undeSIrable to separate it from the other AbysIIiDian languages. or these from thtllr neighbours to the
north and south. ClrcasslIln and Ossetlc are Jomed to the
first group of Aryan languages Jymg to the north-west of
Persia. and contalnlDg Armenian, Georgian, and Kurd.
The followmg IS the Older of the groups. some of the more
important languages. that is, of those best provlded wlth
dlCtlonarles, 8tandlOg alone : EUROPE: Greek. Latm. French. Romance, ScandinaVian
Teutomc (includmg EnglISh and German), CeltIC, Llthu~
anic, SlaVOniC. Ugnan, Turkish.
ASIA: SemitIC. Armeman, Persian. SanskrIt. Indian.
Indo·Chmese. Indian Archipelago. PhllipplOes, Chmese,
Japanese, Northern and Central Asia.
AFRICA: Egypt and Abyss\ma, Eastern Africa, Southern,
Australia and Polynesia.
AUERICA: North. Central (wlth Mexico), South.
EUROPE.

Greek -Athenreus quotes 35 "nters of works. known or sup.
posed to be dlCtionanes. fOI'. as they are all lost. It IS often dIfficult
to decide on theu nature
Of these. Antlclldes. who lived after
the reign of Alexander the Great. wlote 'E(1fY'IT.Kd$. which seems
to have been II SOlt of dictionary. \,elhaps explmmng rhe words and
l'hrasl'S OCC\11Tmg lD anCIent storlCs. ZenOllotus, the first snl,er.
intendent of the grellt IIbmlY of Alexandna. who lived III the
reigns of Ptolemy I and Ptolemy II • wlote r"' ......a •• and also
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agement of the Alexanduan library. wrote II number of "orks, as
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dictlonanes, but II flagment of hiS M( .... pnnted by BOIssonade,
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tlOnary of techmcal terms used ID cookery. N Icander Colophomus.
hereditary pnest of Apollo Clal~us, bom at Claros, near Colophon,
ID loma, l»'obably in reputatton for 60 years, from lSI to 135,
wrote r"' ......a. in at least three books Parthenms... pupIl of the
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before Chllst), wrote on chOICe "ords used by lustonans. Dldymus,
called Xall.«E/lTEPOS, who, accordlllg to Athenreus, wrote 3500 books,
and, I\ccord11lg to Seneca, 4000. wrote lex1eons of the trngIc poets
(of whIch book 28 1.8 quoted). of the comIc poets, of ambIguous
words. and of col'rupt expresslOns G1oSSll{1es of .l.ttlc words "ere
W1'1tten by Cmte'l, Ph!lel1lon. Phlletns, and 'l'heodorus, of (A,'etrul.
by Hermon or Hermonax; of PlI.rygIan, by Neoptolemus; of
Rhodum. by Moschus; of ltalltUl. by Dlooorus of Tarsus. of
foreign words, by SIlenus, of synonym~, by Simanstus; of cookery,
by Heraeleon; and of dnnklllg vessels, by Apollooorus of \.,'yrene.
AccordIng to SUldns, the U\ost anCIent Greek lexicographer WI\S
Al?ollon.us the sophISt, son of ArchIlllus. Accordu:g to the common
0pullon. he lived m tho time of Augustus at AlexandrIa. He composed a lencon of words used by Homor, AlE'" 'Ol'1IP,,,at, a very

183

valuable and useful WOl k, though much IUtcrpolated, edited ",
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The text contains a list of dictionaries and their authors, publishers, dates, languages, and volumes. It also includes references to other works and events such as the French Revolution. The text is organized in a tabular format with columns for author, title, language, and additional information. The document is a dictionary listing.

—Enslin.—Celafogo (Arab.-Eng. and Eng. -Arab.), London, 1858, 8vo.; 2 vols.; 2d ed. 1873, 8vo.; Lane, London, 1873-74, 8vo., 1 vol. book 2. —Klipf—Mandeln, in English, among either the Times of the Sea or The Extremity of the Kamoo. It was undertaken in 1845, at the suggestion and with the consent of Northumberland, the Duke of Northumberland, by Mr. Lee, who returned to Egypt for the purpose, and lived in Cairo for seven years to study, and obtain copies of the great MS. lecrons of the Koran, which had ever before been the possession of Europeans, and which were so properly disappeared through decay, carelessness, and theft, that the means of composing such a work would not have been available. The work is divided into two books, the first, to be completed in 8 parts, containing words and meanings commonly known to learned Arabic; and the second, those that are of rare occurrence, and not commonly known. It does not contain proper names or modern words. The publication, interrupted by his death, will be carried on by his nephew, Mr. Stanley Lane Pollo. The price is fixed at 25 shillings, and will, it is hoped, be far more than advanced in this work, and what materials he has left for continuing it. Dr. Roger is preparing an English-Greek dictionary of at least 1000 pages, which he hopes to publish in 1867, and will be added to the work when completed.

The following dictionary is now in the press, and will be published in parts:—Arabic-English, vol. 1; Arabic-French, vol. 1; Arabic-German, vol. 1; Arabic-Italian, vol. 1; Arabic-Russian, vol. 1; Arabic-Spanish, vol. 1; Arabic-Turkish, vol. 1.

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Phallipenia.— Bood Marcos, Sanpaulo, 1714, fol. Emissa Sanchez, Manila, 1711, fol. Bergho, sn 1722, 4to. Mentrala (also Hulgema and Hayuna), sn 1637, sn 1841, fol. 827 pages Felix de La Encarnacion, sn 1832, 4to, 2 vols 1217 pages. Ram. Espino, Carra, sn 1419, 4to, 2 vols. Bergho, sn 1722, 4to. Tagala Santos, Loyola, 1805, fol. sn 1855, 4to, 857 pages. Noceda and San Lucar, Manila, 1754, fol. 1852 Chinese. — Native Dictionaries are very numerous. Many are very copious and voluminous, and have passed through many editions. Shawon, by Hu Shun, is a collection of the ancient characters, about 10,000 in number, arranged under 542 radicals. In c. 150, usually in 12 vols. Yu pui, by Yu Ye Yang, published a n. 1870, arranged under 542 radicals, as the basis of the Chinese Japanese dictionaries used in Japan "Pong tus woy pwn, Fekin, 1726, 8vo. 130 vols. Pong tus woy fu (Thesaurus of Literary Phrases), 1711, 121 vols. 8vo. prepared by 69 doctors of the Han Lin Academy in 7 years. It contains 10,062 characters, and counts immeasurably in three, or four characters, forming compound words and phrases, with numerous and copious quotations. According to Williams (On the word shun, p. 79), an English translation would fill 140 volumes octavo of 1000 pages each. "Kuang tso tuo (Kanghi's Standard a. Canon of the Character), the dictionary of Kanghi, the first emperor of the present dynasty, was compiled by 30 members of the Han lin, and published in 1716, 40 vols 4to, with a preface by the emperor. It contains 49,500 characters, arranged under 542 radicals. It is generally in 12 vols, and is universally used in China, being the standard authority among native scholars for the characters. Latin. — The Latin characters were brought to Japan by Father Robert C. Martin, in 1874, 4to, 12 vols. Mowbray, part on Williams, Macao, 1844, 4to. Mehdurth, Batavia, 1842-43, 8vo, 2 vols. Thomas, Canton, 1845, 8vo. Lobechund, Hong-Kong, 1857, 4to. Williams, Shanghai, 1875, 4to. Eno Chench — Morton, part on Williams, Macao, 1844, 4to. Mehdurth, Shanghai, 1847-48, 2 vols. Hung Maco, Tung wey fun kuon (Common Words of the Red hair Foreigners), 1875, 8vo. Doolitle, Foochow, 1874, 4to. 1 550 pages. FRENCH-CHIN — Perry (Fr -Lat), Spoken Mandarin), Paris, 1869, 4to. Appended, 1770 Lemaire and Gignoul, Shanghai, 1874, 16mo PORTUGUESE — Gonville (Port - Chin), Macao, 1830, 8vo, 2 vols. (Chon Port), sp 1855, 8vo. Doolitle — Gile, Shanghai, 1874, 4to PORTUGUESE — Gonville (Port - Chin), Macao, 1830, 8vo, 2 vols. (Chon Port), sp 1855, 8vo. Doolitle — Gile, Shanghai, 1874, 4to PORTUGUESE — Gonville (Port - Chin), Macao, 1830, 8vo, 2 vols. (Chon Port), sp 1855, 8vo. Doolitle — Gile, Shanghai, 1874, 4to PORTUGUESE — Gonville (Port - Chin), Macao, 1830, 8vo, 2 vols. (Chon Port), sp 1855, 8vo. Doolitle — Gile, Shanghai, 1874, 4to PORTUGUESE — Gonville (Port - Chin), Macao, 1830, 8vo, 2 vols. (Chon Port), sp 1855, 8vo. Doolitle — Gile, Shanghai, 1874, 4to PORTUGUESE — Gonville (Port - Chin), Macao, 1830, 8vo, 2 vols. (Chon Port), sp 1855, 8vo. Doolitle — Gile, Shanghai, 1874, 4to PORTUGUESE — Gonville (Port - Chin), Macao, 1830, 8vo, 2 vols. (Chon Port), sp 1855, 8vo. Doolitle — Gile, Shanghai, 1874, 4to
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Mexico and Central America—Tephras Rinconia, Mexico, 1747, 4to. Tephras 355, 4to. Nueva mara Staffel, Bunn, 1791, 8vo. Gomes Carohe, Mexico, 1645, 4to. Neve y Molin, 1607, 8vo. Yepes, 1659, 8vo. Pecoco- tamuni, Rome, 1841, 8vo. Meson or Aztec Molon, Mexico, 1855, 4to, 1871, fol 2 vols.; Arenas, 1853, 1111, 8vo, 1863,

DIC'TYS CRETENSIS, one of the early historians from whom the later Roman grammarians imagined that Homer derived materials for the Iliad and Odyssey. According to an introduction prefixed by an unknown writer to the Latin translation entitled Dic'tys Cretensis de Bello Trojan, the author followed Iobemos, king of Crete, in the Trojan war; and the MS of his work, written in Phoenician characters, was found in his tomb at Gnosus at the time of the occurrence of an earthquake in the thirteenth year of Nero. The MS was restored and translated into Greek by order of the Emperor Nerva, a Latin version of the first five books has alone come down to us; but this is generally regarded as a forgery. There is little doubt, however, that there was a Greek original which was probably composed about the time of Nero. The main interest of the work consists in the fact that, along with that of Dares, it was the source from which the Homeric legends were introduced into the romantic literature of the Middle Ages. The editio princeps dates as far back as 1470. The work is now usually printed along with that of Dares. The best editions are those of Perizonius and Doderich (1832).

DIDEROT, Denis (1713-1784), one of the most active and original of the famous group of men of letters in France in the middle of the 18th century. He was born at Langres in 1713, he was educated by the Jesuits, like most of those who afterwards became the bitterest enemies of Catholicism; and, when his education was at an end, he vexed his brave and worthy father's heart by turning away from respectable callings, like law or medicine, and throwing himself into the vagabond life of a bookseller's hack in Paris. An impudent marriage (1740) did not better his position. His wife was a devout Catholic, but her mother did not restrain a narrow and fretful temper, and Diderot's domestic life was irregular and unhappy. He sought consolation for chagrins at home in attachments abroad, first with a Madame Puisieux, a fifth-rate female scribbler, and then with Mlle. Voland, to whom he was constant for the rest of her life. His letters to her are among the most graphic of all the pictures that we have of the daily life of the philosophic circle in Paris. An interesting contrast may be made between the Bohemianism of the famous literary set who supped at the Turk's Head with the Tory Johnson and the Conservative Diderot for their oracles of the Bohemianism of the set who about the same time dined once a week at the Baron D'Holbach's, to listen to the wild sallies and the inspiring declamations of Diderot. For Diderot was not a great writer; he stands out as a fertile, suggestive, and daring thinker, and a prodigious and most eloquent talker.

Diderot's earliest writings were of as little importance as Goldsmith's Enquiry into the State of Polite Learning or Burke's Abridgement of English History. He earned 100 crowns by translating Stanyan's History of Greece, with two colleagues he produced a translation of James's Dictionary of Medicine, and about the same date (1748) he published a free rendering of Shaftesbury's Essay Concerning Human Understanding, with some original notes of his own. With strange and characteristic versatility, he turned from ethical speculation to the composition of a volume of stories, which are gross without liveliness, and impure without wit. In later years he repeated this shameless work, just as Boccaccio is said in the day of his gray hairs to have thought of the sprightliness of the Decameron with strong remorse. From tales Diderot went back to the more congenial region of philosophy. Between the morning of Good Friday and the evening of Easter Monday he wrote the short supplementary essay On the Suficiency of Natural Religion. The gist of these performances is to press the ordinary rationalistic objections to a supernatural revelation, but though Diderot did not at this time pass out into the wilderness beyond natural religion, yet there are signs that he accepted that less as a positive doctrine, resting on grounds of its own, than as a convenient point of attack against Christianity. In 1747 he wrote the Sceptic's Walk, a rather poor allegory—pointing first to the extravagances of Catholicism, second, to the vanity of the pleasures of that world which is the rival of the church, and third, to the desperate and unfathomable uncertainty of the philosophy which professes to be so high above both church and world.

Diderot's next piece was what first introduced him to the world as an original thinker, his famous Letters to the Blind (1749). The immediate object of this short but pithy writing was to show the dependence of men's ideas on their five senses. It considers the case of the intellect deprived of the aid of one of the senses; and in a second piece, published afterwards, Diderot considers, under the case of an equal deprivation of the five senses, the natural and moral consequences of the loss. The Letter on Deaf-Mutes, however, is substantially a digressive examination of some points in aesthetics. The philosoph-
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philic significance of the two essays is in the advance they make towards the principle of Relativity. But what interested the militant philosophers of that day was an episodic application of the principle of relativity to the master-conception of God. What makes the Letter on the Blind interesting at the present moment is its presentation, in a certain though distiguisched, if the modern theory of variability, and of survival by superior adaptation. It is worth noticing, too, as an illustration of the comprehensive freedom with which Diderot felt his way round any subject that he approached, that in this theoretic essay he suggests the possibility of teaching the blind to read through the sense of touch. If the Letter on the Blind introduced Diderot into the worshipful company of the philosophers, it also introduced him to the penalties of philosophy. His speculation was too hardy for the authorities, and he was thrown into the prison of Vincennes. Here he remained for three months; then he was released, to enter upon the gigantic undertaking of his life.

A certain bookseller had applied to him with a project for the translation into French of Ephraimahiasm's Cyclopædia. Diderot accepted the proposal, but in his busy and pregnant intelligence the scheme became transformed. Instead of a mere reproduction of Chambers, he persuaded the bookseller to enter upon a new work, which should collect under one roof all the active writers, all the new ideas, all the new knowledge, that were then moving the cultivated class to its depths, but still were comparatively ineffec tively because of reason of their dispersion. His enthusiasm infected the publishers; they collected a sufficient capital for a vast enterprise than they had at first planned; D'Alembert was persuaded to become Diderot's colleague; the requisite permission was procured from the Government; in 1750 a elaborate prospectus announced the project to a delighted public; and in 1751 the first volume was given to the world. The last of the letter-press was issued in 1765, but it was 1773 before the subscribers received the final volumes of the plates. These twenty years were to Diderot years not merely of incessant drudgery, but of harassing persecution, of sufferings from the cabals of enemies, and of injury from the desertion of friends.

The ecclesiastical party detested the Cyclopædia, in which they saw a rising stronghold for their philosophic enemies. By 1757 the chapel could endure the sight of the booksellers; in 1762 the subscription had grown from 2000 to 4000, and this was a right measure of the growth of the work in popular influence and power. To any one who turns over the pages of these redoubtable volumes now, it seems surprising that their doctrines should have stirred such portentous alarm. There is no atheism, no overt attack on any of the cardinal mysteries of the faith, no direct denunciation even of the notorious abuses of the church. Yet we feel that the atmosphere of the book may well have been displeasing to authorities who had not yet learnt to encounter the modern spirit on equal terms. The Cyclopædia takes for granted the justice of religious tolerance and speculative freedom. It asserts in distinct tones the democratic doctrine that it is the common people in a nation whose lot ought to be the main concern of the nation's government. From beginning to end it is one unbroken process of exaltation of scientific knowledge on the one hand, and popular industry on the other.

All these things were odious to the old governing classes of France; their spirit was absolutist, ecclesiastical, and military. Perhaps the most alarming thought of all was the current belief that the Encyclopædia was the work of an organized band of conspirators against society, and that a pestilent doctrine was now made truly formidable by the confederation of its preachers into an open league. When the seventh volume appeared, it contained an article on "Geneva," written by D'Alembert. The writer contrived a panegyric on the pastors of Geneva, of which every word was a stinging reproach to the abbéis and prelates of Versailles. At the same moment Helvétius's book, L'Esprit, appeared, and gave a still more profound, and, let us add, a more reasonable shock to the ecclesiastical party. Diderot discovered that the bookseller, fearing the unpleasantness of the Government, had struck out from the proof sheets, after they had left Diderot's hands, all passages that he chose to think too hardy. The monument to which Diderot had given the labour of twenty long and oppressive years was irreparably mutilated and defaced. It is calculated that the average annual salary received by Diderot for his share in the Encyclopædia was about £120 sterling. "And then to think," said Voltaire, "that an army contractor makes £800 in a day!"

Although the Encyclopædia was Diderot's monumental work, he is the author of a shower of dispersed pieces that sowed nearly every field of intellectual interest with new ideas; we do not linger. We have come to the point of relating his thoughts for masterpieces; no creation, but a criticism with the quality to impress and direct creation. He wrote plays—le Fils Naturell and le Père de Famille—and they are very inapt performances in the sentimental vein. But he accompanied them by essays on dramatic poetry, including especially the Paradoxe sur le Comédien, in which he announced the principles of a new drama—the serious, domestic, bourgeois drama of real life, in opposition to the stilted conventions of the classic French stage. It was Diderot's lessons and example that gave a decisive bias to the dramatic taste of Lessing, whose plays, and his Hamburgerische Dramaturgie (1766), mark so important an epoch in the history of the modern theatre. In the pictorial art, Diderot's criticisms are no less rich, fertile, and wide in their ideas. His article on "Beauty" in the Encyclopædia shows that he had mastered and passed beyond the metaphysical theories on the subject, and the Essay on Painting was justly described by Goethe, who perhaps thought it worth translating, as "a magnificent work, which speaks even more helpfully to the poet than to the painter, though to the painter too it is as a blazing torch." Diderot's most intimate friend was Grimm, one of the conspicuous figures of the philosophic body. Grimm wrote news-letters to various high personages in Germany, reporting what was going on in the world of art and
literature in Paris, then without a rival as the capital of the intellectual activity of Europe. Diderot helped his friend at one time and another between 1759 and 1779, by writing for him an account of the annual exhibitions of paintings. These Salons are among the most readable of all pieces of art criticism. They have a freshness, a reality, a life, which took their readers into a different world from the dry and conceited pedantry of the ordinary virtuoso. As has been said by Ste-Beuve, they initiated the French into a new sentiment, and introduced people to the mystery and purport of colour by ideas. "Before Diderot," Madame Necker said, "I had never seen anything in pictures except dull and lifeless colours; it was his imagination that gave them relief and life, and it is almost a new sense for which I am indebted to his genius."

Greuze was Diderot's favourite among contemporary artists, and it is easy to see why. Greuze's most characteristic pictures were the rendering in colour of the same sentiment of domestic virtue and the pathos of common life, which Diderot attempted with inferior success to represent upon the stage. For Diderot was much more interested in the life of men,—not the abstract life of the race, but the incidents of individual character, the fortunes of a particular family, the relations of real and concrete motives in this or that special case. He delighted with the enthusiasm of a born naturalist, in curious puzzles of right and wrong, and in devising a conduct between the generalities of ethics and the conditions of an ingeniously contrived practical dilemma. Mostly his interest expressed itself in didactic and sympathetic form; in two, however, of the most remarkable of all his pieces, it is not sympathetic but trivoual. Jacques le Fataliste (written in 1772, but not published until 1796) is in manner an imitation of Tristram Shandy and The Sentimental Journey. Few modern readers will find in it any true diversion. In spite of some excellent criticisms dispersed here and there, and in spite of one or two stories that are not without a certain effective realism, it must as a whole be pronounced savoury, forced, and as leaving unmoored those springs of laughter and of tears which are the common fountain of humour. Rameau's Nephew is a far superior performance. If there were any inevitable complication to name a masterpiece for Diderot, one must select this august "farce-tragedy." Its intention has been matter of dispute; whether it was designed to be merely a satire on contemporary manners, or a reduction of the theory of self-interest to an absurdity, or the application of an ironical clench to the ethics of ordinary convention, or a mere setting for a discussion about music, or a vigorous dramatic sketch of a parasite and a human original. There is no dispute as to its curious literary flavour, its mixed qualities of pungency, bitterness, pity, and, in places, unflinching shamelessness. Goethe's translation (1805) was the first introduction of Rameau's Nephew to the European public. After executing it, he gave back the original French manuscript to Schiller, from whom it had gone. No authentic French copy of it appeared until the writer had been nearly forty years in his grave (1823).

It would take several pages of this encyclopaedia merely to contain the list of Diderot's small productions, from an infinitely graceful tribute like the Requies on My Old Dressing-Gown up to D'Alembert's Dream, where he plunges into the depths of the controversy as to the ultimate constitution of matter and the meaning of life. It is a mistake to set down Diderot for a coherent and systematic materialist. We ought to look upon him as "a philosopher in whom all the contradictions of the time struggled with one another" (Rosankrantz). That is to say, he is critical and dogmatic. There is no unity in Diderot, as there was in Voltaire or in Rousseau. Just as in cases of conduct he loves to make new ethical assumptions and argue them out as a professional sophist might have done, so in the speculative problems as to the organization of matter, the origin of life, the compatibility between physiological machinery and free will, he takes a certain standpoint, and follows it out more or less digressively to its consequences. He seizes an hypothesis and works it to its end, and thus made him the inspirer in others of materialist doctrines which they held more definitely than he did. Just as Diderot could not attain to the concentration, the positiveness, the finality of aim needed for a masterpiece of literature, so he could not attain to those qualities in the way of dogma and system. Yet he drew at last to the conclusions of materialism, and contributed many of its most declaratory pages to the Système de la Nature of his friend D'Holbach,—the very Bible of atheism, as some one styled it. All that he saw, if we reduce his opinions to formulas, was motion in space, "attraction and repulsion, the only truth." If matter produces life by spontaneous generation, and if man has no alternative but to obey the compulsion of nature, what remains for God to do? In proportion as all things interest him deepened in him, the more did Diderot turn for the hope of the race to science, in other words, to such a regulation of conduct and motive as shall make us tender, pitiul, simple, contented. Hence has one great literary passion, his enthusiasm for Richardson, our English novelists. Hence, also, its deepening aversion for the political system of France, which made the realiza-

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tion of a natural and contented domestic life so hard. Diderot had almost as much to say against society as against Rousseau himself. The difference between them was that Rousseau was a fervent theist. The atheism of the Holbachians, as he called Diderot's group, was repugnant to him, and this feeling, aided by certain private prejudices of humour, led to a breach of what had once been an intimate friendship between Rousseau and Diderot (1737). Diderot was still alive when the Confessions appeared, and he was so exasperated by Rousseau's stories about Grimm, then and always Diderot's intimate, that in 1782 he transformed a life of Seneca, that he had written four years earlier, into an Essay on the Reigns of Claudius and Nero, which is much less an account of Seneca than a vindication of Diderot and Grimm, and is one of the most rambling and inert productions in literature. As for the merits of the old quarrel between Rousseau and Diderot, we may agree with the latter, that too many sensible people would be in the wrong if Jean Jacques was in the right. Varied and incessant as was Diderot's mental activity, it was not of a kind to bring him riches. He secured none of the posts that were occasionally given to needy men of letters, he could not even obtain that bare official recognition of merit which was implied by being chosen a member of the Academy. The time came for him to provide a dowry for his daughter, and he saw no other alternative than to sell his library. When the empress Catherine of Russia heard of his straits, she commissioned an agent in Paris to buy the library at a price equal to about £1000 of our money, and then she handsomely requested the philosopher to retain the books in Paris until she required them, and to constitute himself a librarian, with a yearly salary. In 1773 Diderot started on an expedition to thank his imperial benefactress in person, and he passed some months at St Petersburg. The empress received him cordially. The strange pair passed their afternoons in disputes on a thousand points of high philosophy, and they debated with a vivacity and freedom not usual in courts. "'Fi, douc!' said Catherine one day, when Diderot hinted that he argued with her at a disadvantage, 'is there any real difference among men?" Diderot returned home in 1783. Ten years remained to him, and he spent them in the same disastrous acquisition of new knowledge, in the compo
of a host of fragmentary pieces, some of them mentioned above, and in luminous declamations with his friends. All accounts agree that Diderot was seen at his best in conversation. "He who only knows Diderot in his writings," says Marmonet, "does not know him at all. When he grew animated in talk, and allowed his thoughts to flow in all their abundance, then he became truly ravishing. His writings he had not the art of ensemble; the first operation which orders and places everything was too slow and too painful to him." Diderot himself was conscious of the want of literary merit in his pieces. In truth he set no high value on what he had done. It is doubtful whether he was ever alive to the waste that circumstance and temperament together made of an intelligence from which, if it had been free to work systematically, the world of thought had so much to hope. He was one of those simple, disinterested, and intellectually sterling workers to whom their own personality is as nothing in presence of the work and the art that engage the thoughts of their lives. He wrote what he found to write, and left the pieces, as Carlyle has said, "on the waste of accident, with an ostrich-like indifference." When he heard that a collected edition of his works was in the press at Amsterdam, he greeted the news with "peals of laughter," so well did he know the haste and the little heed with which those works had been dashed off.

Diderot died in the month of July 1784, six years after Voltaire and Rousseau, one year after his old colleague D'Alembert, and five years before D'Holbach, his host and intimate of a lifetime. Notwithstanding Diderot's peals of laughter at the thought, there is now just completed—nearly a hundred years since his death—an elaborate and exhaustive collection of his writings in twenty stout volumes, edited by MM. Asseass and Tournoux. (J. Mo.)

DIDOT, or ELISA, the reputed founder of Cartaghe, was the daughter of Muteo, Belus, or Agenor, king of Tyre. She may have been an historical character, but the stories told of her by Justin and Virgil differ essentially. She was worshipped at Cartaghe, and as a deity may be identified with Juno Coelestis, the Roman form of the Phoenician Astarte.

DIDOT, the name of a family of learned French printers and publishers. FRANCOIS DIDOT (1659-1737), founder of the family, was born at Paris. He began business as a bookseller and printer in 1713, and among his undertakings was a collection of the travels of his friend the Abbé Prévost, in 20 volumes (1747). It was remarkable for its typographical perfection, and was adorned with many engravings and maps.

FRANCOIS AMBROISE DIDOT (1730-1804), son of François, made important improvements in type-founding, and was the first to attempt printing on vellum paper. Among the works which he published was the famous collection of French classics prepared by order of Louis XVI. for the education of the Dauphin, and the folio edition of ZArt de l'Imprimeur (1835). PIERRE FRANCOIS DIDOT (1732-1798), brother of the preceding, devoted much attention to the art of type-founding and to paper-making. Among the works which issued from his press was an edition in folio of the Imitatio Christi (1785).

HENRI DIDOT (1755-1853), son of Pierre François, is celebrated for his "microscopic" editions of various standard works, for which he engraved the type when nearly seventy years of age. He was also the engraver of the assignats issued by the Constituent and Legislative assemblies and the Convention.

DIDOT SAINT-LOREN, second son of Pierre François, was the inventor of the paper-making machine known in several lands as the Didot machine.

PIERRE DIDOT (1760-1855), eldest son of François Ambroise, is celebrated as the publisher of the beautiful "Louvre" editions of Virgil, Horace, and Racine. The Racine, in 3 volumes folio, was pronounced in 1801 to be "the most perfect typographical production of all ages."

FRANCOIS AMBROISE DIDOT (1790-1876), was the eldest son of the preceding. After receiving a classical education, he spent three years in Greece, and in the East; and on the restoration of his father in 1827 he undertook, in conjunction with his brother Hyacinthe, the direction of the publishing business. Their greatest undertaking was a new edition of the Thesaurus Græco Lignae of Henry Stephens, under the editorial care of the brothers Dindorf and M. Haas (9 vols. 1855-59). Among the numerous important works published by the brothers, the 200 volumes forming the Bibliotheca des auteurs grecs, Bibliothèque latine, and Bibliothèque française deserve special mention. Ambroise Firmin Didot was the first to propose (1823) a subscription in favour of the Greeks, then in insurrection against Turkish tyranny. Besides a translation of Thucyldides (1833), he wrote the articles "Étienne" in the Nouvelle Biographie Générale, and "Typographie" in the Encyc. Mod., as well as Observations sur Orthographe françaises (1867), &c. In 1875 he published a very learned and elaborate monograph on Aldus Manutius. His collection of MSS., the richest in France, was said to be worth, at the time of his death, not less than 2,000,000 francs.

DIDRON, ADOLPHE NAPOLEON (1806-1867), French archaeologist, was born at Hautvillers, in the department of Marne, March 13, 1806. At first a student of law, he began in 1830, by the advice of Victor Hugo, to apply himself to the study of the Christian archeology of the Middle Ages. After visiting and examining the principal churches, first of Normandy, then of Central and Southern France, he was on his return appointed by M. Guizot secretary to the Historical Committee of Arts and Monuments (1835); and in the following years he delivered several courses of lectures on Christian Iconography at the Bibliothèque Royale. In 1839 he visited Greece for the purpose of examining the art of the Eastern Church, both in its buildings and its manuscripts. In 1844 he originated the Annales Archeologiques, a periodical devoted to his favourite subject, which he edited until his death. In 1845 he established at Paris a special archaeological library, and at the same time a manufacture of painted glass. In the same year he was admitted to the Legion of Honour. His most important work is the Iconographie Chrétienne, of which, however, the first portion only, Histoire de Dieu (1843), was published. It was translated into English by E. J. Millington. Among his other works may be mentioned the Manuel d'Iconographie Chrétienne grecque et latine (1845), the Iconographie des chapiteaux du palais ducale de Venise (1857), and the Manuel des objets de bronze et d'orfévrerie (1859). He died November 13, 1867.

DIDYMUS of Alexandria, an ecclesiastical writer, born in 590 or 514. Although he became blind at the age of four, before he had learned to read, he succeeded in mastering the whole circle of the sciences then known; and on enter-
DIE (Dea Venta), the capital of an arrangement in the department of Diois, in France, is sited on the right bank of the Drôme, at the foot of Mont Glazand, in a wide and fertile plain. The manufactures are woollen cloth, paper, leather, and silk; there is some trade in mules, cattle, and wood, and the neighborhood produces excellent fruit, and the white wine called "Clairette de Die." The town was formerly the seat of a bishop, and, prevaing to the revocation of the Edict of Nantes in 1655, of a Calvinistic university. The most interesting structures of Die are the old cathedral, with granite columns from an ancient temple of Cybele, and a porch of the 11th century, the episcopal palace, the walls, flanked by towers, and the ruins of a castle—all of considerable age; the triumphal arch on the road towards Gap, known as the Porte St Marcel, portions of an aqueduct, and other Roman remains. In the vicinity are several mineral springs. The population in 1872 was 3676.

DIE SINKING. The preparation of dies for stamping coins and medals is a work requiring considerable skill and care. The steel selected should be of moderately fine grain and uniform texture, and, when polished, should show no spots or patches under a magnifying glass. Two short lengths having been cut from bars of this, and forged into rough dies, are next made as soft as possible by careful annealing—being put in an iron pot of animal charcoal, heated to a cherry red, and allowed to cool gradually. After being faced up finely and smoothly in a lathe, they pass into the hands of the engraver, who traces upon them their appropriate images, obverse and reverse, and works out these, with steel tools, in magitago (The inscription is generally stamped with punches and hammer.) The most interesting structures of Die are plain matrices, or maternal dies, when, after repeated impressions on clay, &c, and alteration, they are found correct, are ready for hardening—a process simple enough as regards plain steel, but here very critical, seeing that a delicate engraving has to be kept intact. Each matrix is first protected with a mask, composed of fixed oil thickened with animal charcoal, or of lampblack and linseed oil. They are then placed face downwards in a crucible, and burned in animal charcoal. After being heated to a cherry red, they are taken out with a pair of tongs, plunged in a large body of water, moved about rapidly till all noise ceases, and left in the water till quite cool. If the matrix purrs or sings, there is probably a crack in it. The hardened die is next polished and tempered,—the former by holding it against a running iron disc coated with four-emery and oil; the latter by putting it in water, which is gradually raised to the boiling point, then allowing it to cool slowly, or by placing it on a heated bar of iron till it acquires a rich straw colour. To increase its strength an iron ring may be shrunk upon it like a mechanical jacket. The matrix, treated as here described, might now be used to multiply, or mold, but it is preferred to use it for first producing punches, or steel impressions in relief. With this a steel block is procured, softened by annealing, and turned in the lathe, being made flat at the bottom and obtusely conical at the top. The block is put in the bed of a die-stamping press, and the matrix brought down on it with force by means of the central screw. Thus a copy is produced in relief on the conical surface. Further strokes may be required to perfect it, and the punch is therefore first annealed (its surface having been hardened by compression), then replaced in the press, the matrix, detached from the screw, is fitted on to it, and pressed in contact by the descent of a block of steel attached to the screw. Thus, after repeated blows and frequent annealing, the impression is completed, and after being retouched by the engraver is hardened and tempered like the matrix. The matrix is now laid aside, and the punch used to produce any number of steel dies by an operation substantially similar to that by which the punch itself was obtained. These are, of course, facsimiles of the matrix, and when completed are used for purposes of coupage. Besides coinage and medallion, dies are required for a variety of purposes, such as the manufacture of buttons, steel seals, screws, and ornamental articles of metal, calico printing, &c.

DIEBITSCH-SABAŁKANSKI, HANS KARL FRIEDRICH ANTON (1753-1834), Count von Diebitsch and Narden, a Russian field-marshal, was born in Sulawa, May 13, 1753. He entered the Prussian army at the age of twelve; but four years later, by the desire of his father, a Prussian officer who had passed into the service of Russia, he also did the same. He served in the campaign of 1805, and was wounded at Austerlitz, fought at Eylau and Friedland, and after Friedland was promoted captain. During the next five years of peace he devoted himself to the study of military science, engaging once more in active service in the campaign of 1812. He distinguished himself by the recapture of Polock, partly by his defence of an important post he saved Wittgenstein's corps in retreat. He was now raised to the rank of major-general. In conjunction with General Yorck he took possession of Berlin. After the battle of Lutzen he was sent into Silesia and took part in negotiating the secret treaty of Reichenbach. Having distinguished himself at the battles of Dresden and Leipzig, he was promoted lieutenant-general. In 1814 Diebitsch strongly urged the march of the allies on Paris; and after their entry the emperor Alexander conferred on him the order of St Alexander Nevski. In 1815 he marrled, attended the Congress of Vienna, and was afterwards made adjutant-general to the emperor. As chief of the imperial staff he accompanied the emperor to Tagerogrod, and was present at his death. He obtained the confidence of the emperor Nicholas, and was created baron and after wards created prince. In 1828-1829, in the Turkish war, having distinguished himself as an officer, he shared the passage of the Bosphorus and the capture of Adrianople. His passage of the Balkan is commemorated by his surname Sabalkanski; it procured him the rank of field-marshal. On the outbreak of the insurrection in Poland, in 1830, he was appointed to the chief command. His good genius, however, now failed him. After the battle of Ostrołęka he transferred his head quarters to Kieckzewo, near Pultusk, where he died of cholera, June 10, 1831.

DIEFENBECK, ABRAM VAN (1599-1675), was born at Herzogenbusch, and studied painting at Antwerp, where he became one of Rubens's "hundred pupils." Rubens complains in his letters that, being oversupplied with applications for apprentices' indentures, he refused to accept as disciples even the children of some of his best friends. Diepenbeck was one of those who was fortunate enough to obtain admission to Ruben's workshop. But he was not one of the cleverest of Rubens's followers, and he succeeded, at the best, in imitating the style and aping the peculiarities of his master. We see this in his earliest pictures—a portrait dated 1629 in the Munich Pinakothek, and a Distribution of Alms of the same period in the same...
collection. Yet even at this time there were moments when Diepenbeek probably fancied that he might take another path. A solitary copperplate executed with his own hand in 1630 represents a peasant sitting under a tree holding the bridle of an ass, and this is a minute and finished specimen of the engraver's art, which shows the master might at one time have hoped to rival the animal draughtsmen who flourished in the schools of Holland. However, large commissions now poured in upon him; he was asked for altar-pieces, subject pieces, and pagan allegories. He was tempted to try the profession of a glass-painter, and at last he gave up every other occupation for the lucrative business of a draughtsman and designer for engravings. Most of Diepenbeek's important canvases are in Continental galleries. The best are the Marriage of St. Catherine at Berlin, and Mary with Angels Wailing over the Dead Body of Christ in the Belvedere at Vienna, the first a very fair specimen of the master's skill, the second a picture of more energy and feeling than might be expected from one who knew more of the outer form than of the spirit of Rubens. Then we have a fine Entombment at Brunswick, and St. Francis Adoring the Sacrament at the museum of Brussels, Celia and her Nymphs Flying from the Presence and Pursuit of Furies in two examples at Berlin and Paris, and Neptune and Amphitrite at Dresden. In all these compositions the drawing and execution are after the fashion of Rubens, though inferior to Rubens in harmony of tone and force of contrasted light and shade. Occasionally a tendency may be observed to mutate the style of Van Dyck, for whom, in respect of pictures, Diepenbeek in his lifetime was frequently taken. But Diepenbeek spent much less of his leisure on canvases than on glass-painting. Though he failed to master the secrets of gorgeous tints, which were lost, apparently for ever in the 16th century, he was constantly employed during the best years of his life in that branch of his profession. In 1635 he finished forty scenes from the Life of St. Francis of Paula in the church of the Minimes at Antwerp. In 1644 he received payment for four windows in St. Jacques of Antwerp, two of which are still preserved, and represent the Virgin and Child to whom Christ appears after the Resurrection. The windows ascribed to him at St. Gudule of Brussels are now proved to have been executed from the cartoons of Theodore van Thulden. On the occasion of his matriculation at Antwerp in 1638–9, Diepenbeek was registered in the guild of St. Luke as a glass-painter. He resigned his membership in the Artist Club of the Violette in 1643, apparently because he felt hurt by a valuation then made of drawings furnished for copper-plates to the engraver Peter de Jade. The earliest record of his residence at Antwerp is that of his election to the brotherhood (Sodalité) "of the Bachelors" in 1634. It is probable that before this time he had visited Rome and London, as noted in the work of Houbraken. In 1653 he was made a brother of Antwerp. He married twice, in 1637 and 1652. His death took place in December 1675, and his funeral was celebrated at St. Jacques of Antwerp on the 31st day of that month.

Consult, besides earlier authorities, the Antwerp Register.

DIEPPE, a seaport town of France, at the head of an armament at the department of Seine-Inférieure, 38 miles north of Rouen and 135 north-west of Paris by rail, in 49° 55' 35" N. lat. and 1° 8' E. long. It lies at the mouth of the River Arques, in a hollow of the coast, the main part of the town being on the west side of the river, and the suburb of Follet on the east. Its principal street stretches for about a mile along the shore, and terminates in the west at the foot of the chalk cliff, which is surmounted by a castle of the 15th century, now employed as barracks, founded in the 13th century, but consists in 500 measure of considerably later workmanship, and has in some portions been restored in the present century; the main entrance (of the 14th century) and the Anglo chapel are worthy of special remark. It is sufficient to mention the church of St. Remi (1522–1540), the town-house, the hospital, the theatre, and the communal college which preserves some fragments of Anglo's masque. As the chief town of an armament, and an important seaport, Dieppe is the seat of a large number of public offices. Its harbour, which has been greatly improved during the present century, is protected by two piers, admits vessels of 500 tons burden, and has a large floating dock. There is regular steamboat communication with England, the passage to Newhaven being accomplished in about six hours. The general trade of the town, both export and import, is extensive; and it carries on ship-building, rope-spinning, cooperage, watch-making, and a remarkable manufacture of articles in ivory and bone, which dates from the 15th century. The tobacco factorises alone employ upwards of 1000 work people. Oysters in large numbers are fattened in the retenue des chasses; and the fishermen of Follet are among the main providers of the Parisian markets. Every since the time of the duchess of Berry (whose favourite residence, the maison Queneville, is still pointed out) the town has been a fashionable watering-place; and in 1857 a large bathing establishment was erected after the model of the Crystal Palace. The so-called Jardin Anglais, the Cours Bourbon, and the cliffs are the principal promenades; and the castle of Arques, the Manoir d'Ango, the abbey of St. Victor, and the ancient camp, locally known as la cité des Limes, are the most interesting objects of interest in the neighbourhood. Population in 1851, 15,216; and in 1872, 15,767.

It may be safely asserted, on the authority of its name, that Dieppe owed its origin to a band of Norman adventurers, who founded its "diep" or inlet suitable for their ships. Its first castle was probably built in 1148 by Henry II. of England, and it was counted of some importance when Philip Augustus attacked it in 1195. By Richard I. of England it was bestowed, in 1197, on the archbishop of Rouen in return for certain territory in the neighbourhood of the episcopal city. In 1339 it was plundered by the English, but it soon recovered from the blow, and was, in spite of the opposition of the Lorrain and Huxley, managed to surround itself with fortifications. Its commercial activity was great, and it is believed its seamen visited the coast of Guenea in 1539, and found there a Petit Dieppe in 1565. A siege undertaken in 1544 by Talbot in person was raised by the Dauphin during Louis XI., and the day of the deliverance continued for centuries to be celebrated by a great procession and miracle plays. In the beginning of the 16th century we find Parmentier, a native of the
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town, taking refuge to Brazil and Sumatra; and a little later, its merchant prince, Ango, was able to blockade the Portuguese fleet of 1766. The inhabitants of "St. Thomas" (St. Thomas) rebelled against the Reformed religion, and they were among the first to acknowledge Henry IV, who fought one of his great battles at the neighbouring village of Arques. Few of the cities of France suffered more from the revolution of the Edict of Nantes in 1685, and this blow was followed in 1694 by a terrible bombardment on the part of the English and Dutch. The town was re-built after the peace of Breda, but the decrease of its population and the deterioration of its port prevented the restoration of its commercial prosperity. Within the present century, however, especially since communication by rail was effected with Paris, it has made rapid advances.

During the French-German war the town was occupied by the Germans from December 1759 till July 1787.

See Pietro Pitton, Recueil général des édits, de decrets, d'ordres, etc., en faveur des habitants de Dieppe, Dieppe, 1707; Vitet, Histoire de Dieppe, 1844; Coulet, Les billets de l'Empreinte de Dieppe, 1846-1850; and Galerie Dieppoise, 1862; Joules Hardy, Les Dieppoises en Guerre en 1804, 1804; Amiel, Les Antiquités et Chroniques de la ville de Dieppe, a 17th century account, which came down only to 1694, and was first published in 1874 by Hardy, Guillon, and Sauvage.

DIES, CHRISTOPH ALBERT (1755-1822), was born at Hanover, and learned the rudiments of art in his native place. For one year he studied in the academy of Dusseldorf, and then he settled at Rome, where he became a second Salvator Rosa.

He was elected by the chief princes to be present, and his voice was a feudal, not a representative, Parliament. As by degrees the feudalities of the emperor turned into independent sovereigns, the Diet became nothing more than a congress of princes.

The earliest Diet of the German Holy Roman Empire was assembled in which the monarch deliberated with his subjects on the common interests of the empire. Originally all members were bound by their feudal tenure to be present, and if absent they not only forfeited their vote but were liable to fine. Thus the Diet was a feudal, not a representative, Parliament.

At first the emperor was, in theory at least, elected by universal suffrage; a candidate was chosen by the chief men, and their nominees approved by the people. Thus we read that at the election of Conrad II, 50,000, and at that of Lothair II, 60,000 persons were present. In time the custom of nominating the emperor grew into an established right, which, under the name of "prerogative," was arrogated by the chief princes of the empire. Thus the chief function of the Diet, the choice of an emperor, became the prerogative of a few of its most powerful members, who claimed the right not only of election but of deposition.

At the Diet of 1298 Alphonsus of Nassau was deposed, and Albert of Austria chosen in his stead. The right of the electors and the forms and rules of election were defined and settled by the famous instrument of Charles IV., known as the Golden Bull, 1298.

The Diet consisted of three bodies, who met and voted in separate colleges,—(1) the electoral college, (2) the princes of the empire spiritual and temporal, (3) the free imperial cities.

1. In a law of Otho IV. (1098), we find the right of electing an emperor vested in the electoral college.

2. The princes of the empire had in all other respects, save that of electing an emperor, the same rights as the dukes or electors. They consisted of the archbishop of Salzburg, 20 bishops, 4 abbots, and 2 prebendaries, and of 44 temporal princes, though the number was afterwards largely augmented. Of these several, such as the archduke of Austria, and the dukes of Brunswick and Burgundy, were in rank and power more than equals of the electors.
3. The free imperial cities formed a college divided into two benches,—the Swabian, with 37 cities, and the Rhenish, with 14. They first appear at the Diet under Henry VII, but their position was not recognized till the peace of Westphalia. The power exercised by this municipal constituent of the Diet was small and strictly limited. Only what had been agreed upon by the electors and princes could be submitted to the college of cities for their sanction. The lower nobility, the knights of the empire, and the commons were unrepresented.

Each college voted separately; when the three colleges agreed, the decree or resum of the Diet, as it was called, was submitted to the emperor for his ratification; but the emperor had no power to modify it, and no resolution which affected the general interests of the empire could be passed without the approbation of the Diet.

Besides extraordinary meetings, the Diet was regularly convened twice a year. At the spring season the general phases of internal government and foreign policy were discussed, alliances concluded, rebels proscribed, and grants of feu confirmed. The autumn session was occupied with finance and attended only by dukes, counts, and officers of administration. From 1603 the Diet met at Regensburg.

From the end of the Thirty Years’ War the power of the Diet rapidly declined. The Peace of Westphalia, while confirming the rights of the Diet as against the emperor, at the same time, by recognizing the territorial independence of the German princes, so limited the province of the federative assembly that, to quote the words of Frederick the Great, the Diet became “a mere shadow, a congress of publicists more bound with forms than things, like dogs who bay the moon.”

The most important Diets were the following:—

1106. Maint. Henry IV. deposed on motion of his son.
1142. Frankfurt. Conrad surrendered Saxony to Henry the Lion.
1483. Worms. Edict against Luther.
1526. Speira. Choice of religion allowed to the several states.
1529. Speira. Edict of Worms re-enacted.
1530. Augsburg. The confession of Augsburg presented.
1806. Regensburg. Napoleon’s envoy announces the dissolution of the empire.
1848. Frankfurt. First Diet of German confederation.

DIETETICS. —The application of science to the regulation of the continuous demands of the body for nutriment aims mainly at three objects—Health, Pleasure, Economy. They are rarely inconsistent with one another, but yet require separate consideration, as under varying circumstances each may claim the most prominent place in our thoughts.

Influence of Diet upon Health.

The influence of diet upon the health of a man begins at the earliest stage of his life, and indeed is then greater than at any other period. It is varied by the several phases of internal growth and of external relations, and in old age is still important in prolonging existence, and rendering it agreeable and useful.

Diet in Infancy. —No food has as yet been found so suitable for the young of all animals as their mother’s milk. And this has not been from want of seeking. Dr Brouzet (Sur l’Education medecinale des Enfants, i. p. 165) has such a bad opinion of human mothers, that he expresses a wish for the state to interfere and prevent them from suckling their children, lest they should communicate immorality and disease! A still more determined pessimist was the famous chemist Van Helmont, who thought life had been reduced to its present shortness by our inborn propensities, and proposed to substitute bread boiled in beer and honey for milk, which latter he calls “brute’s food.” Baron Liebig has followed the lead with a “Food for infants,” in the prescription for which half ounces and quarter grains figure freely, and which has to be prepared on a slow fire, and after a few minutes boiled well. And after all not nearly such a close imitation of human milk is made as by the addition to fresh cow’s milk of half its bulk of soft water, in each pint of which has been mixed a heaped up teaspoonful of powdered “sugar of milk” and a pinch of phosphate of lime. Indeed, in default of these cheap chemicals, the milk and water alone, when fresh and pure, are safer than an artificial compound which requires co-cooking. And experience shows that the best mode of administering food to the young is also that which is most widely adopted throughout warm-blooded nature, namely, in a fresh, tepid, liquid state, frequently, and in small quantities at a time.

Empirical observation is fully supported in these deductions by physiological and chemical science. Milk contains—

<table>
<thead>
<tr>
<th>Component</th>
<th>Quantity</th>
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<tbody>
<tr>
<td>Water</td>
<td>669</td>
</tr>
<tr>
<td>Olesogeous matter</td>
<td>88 per cent.</td>
</tr>
<tr>
<td>Nitrogenous matter</td>
<td>41</td>
</tr>
<tr>
<td>Hydrocyanic acid</td>
<td>41</td>
</tr>
<tr>
<td>Sialine matter</td>
<td>41</td>
</tr>
<tr>
<td>Phosphate of lime</td>
<td>41</td>
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These are at once the constituents and the proportions of the constituents of food suited to a weakly rapidly-growing animal. The large quantity of water makes it pass easily through the soft absorbent walls of the digestive canal, and the complete suspension in an alkaline fluid of the finely divided fat and nitrogenous matter introduce more of them than could be effected were they in a solid form. The fat is the germ of new cellular growth, and the nitrogenous matter is by the new cells formed into flesh, which is doubling its bulk monthly. The phosphate of lime is required for the hardening of bones, the chloride of sodium and the iron for the daily increasing amount of blood in circulation. Milk may be said to be still alive as it leaves the breast fresh and warm, and quickly becomes living blood in the infant’s veins. A very slight chemical change is requisite. Its frequent administration is demanded by the rapid absorption, and the absence of regular meals prevents the overloading of the delicate young stomach with more than it can hold at once.

The wholesomest nutriment for the first six months is milk alone. A vigorous baby can indeed bear with impunity much rough usage, and often appears none the worse for a certain quantity of farinaceous food; but the majority do not get habituated to it, without an exhibition of dislike which indicates rebellion of the bowels. To give judicious diet its fair chance the frame must be well protected from the cold; and just in proportion as the normal temperature of the body is maintained so does growth prosper, as is satisfactorily proved by experiments on the young of the lower animals.

It is only when the teeth are on their way to the front, as shown by dribbling, that the parotid glands secrete an active saliva capable of digesting bread stuffs. Till then anything but milk must be given tentatively, and considered in the light of a means of education for its future mode of nutrition. Among the varieties of such means, the most generally applicable are broth and beef tea, at first pure, and then thickened with tapioca and arrowroot. Chicken soup, made with a little cream and sugar, serves as a change. Baked flour, biscuit powder, tops and bottoms, should all have their turn; change is necessary in the imperfect dietary which art supplies, and for change the stomach should be prepared by habit.

The consequences of premature weaning are insidious. The external aspect of the child is that of health, its muscles
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are strong, but the bones do not harden in proportion, and if it tries to walk its limbs give way, and it is said to be suffering from rachitis or "rickets."

These consequences follow in other animals as surely as in the human race; and in them it was possible to make the experiment cruel. A gentleman named Guérin set himself to find if he could produce rickets at will. He took a number of puppies in equally good condition, and having let them suckle for a time, he suddenly weaned half of them and fed them on raw meat, a fare which at first thought would seem the most suitable for carnivorous animals. Nevertheless, after a short time, those which continued to take the mother's milk had grown strong and hearty, whilst those which had been treated with a more substantial dietary pined, and frequently threw up their vitrals, then their limbs bent, and at the end of about four months they showed all the symptoms of confirmed rickets. From these experiments we must conclude that the rachitis depended mainly on the derangements of nutrition brought on by improper feeding. A diet which may fairly be called improper. For carnivora, it is flesh before the age of sucking has passed; for herbivora (and an experiment bearing on the point has been made on pigs), it is vegetable feeding begun when they ought to be at the teat.

The time for weaning should be fixed partly by the child's age, partly by the growth of the teeth. The troubles to which children are subject at this crisis are usually gastric, such as are induced by summer weather; therefore at that season the weaning should be postponed, whereas in winter it should be hurried forward. The first group of teeth nine times out of ten consists of the lower central front teeth, which may appear any time during the sixth and seventh month. The mother may then begin to diminish the number of sucking times, and by a month she can have reduced them to twice a day, so as to be ready when the second group makes its way through the upper front gums to cut off the supply altogether. The third group, the lateral incisors and first grinders, usually after the first anniversary of birth give notice that solid food can be chewed. But it is prudent to let dairy milk form a considerable portion of the fare till the eye teeth are cut, which seldom happens till the eighteenth or twentieth month. At this period children are liable to diarrhoea, convulsions, irritation of the brain, rashes, and febrile catarrh. In such cases it is often advisable to resume a complete milk diet, and sometimes a child's life has been saved by its reapplication to the breast. These means are most feasible when the patient is accustomed to milk; indeed, if not, the latter expedient is hardly possible.

Diet in Childhood and Youth.—At this stage of life the diet must obviously be the best, which is a transition from that of infancy to that of adult age. Growth is not completed, but yet entire surrender of every consideration to the claim of growth is not possible, nor indeed desirable. Moreover that abundance of adipose tissue, or reserve new growth, which a baby bear, is an impediment to the due education of the muscles of the boy or girl. The supply of nutrient needs not to be so continuous as before, but at the same time should be more frequent than for the adult. Up to at least fourteen or fifteen years of age the rule should be four meals a day, varied indeed, but nearly equal in nutritive power and in quantity, that is to say, all moderate, all sufficient. The maturity the body then reaches involves a hardening and enlargement of the bones and cartilages, and a strengthening of the digestive organs, which in healthy young persons enables us to dispense with some of the watchful care bestowed upon their diet. Three full meals a day are generally sufficient, and the requirements of mental training may be allowed to a certain extent to modify the attention to nutrition which has hitherto been paramount. But it must not be forgotten that the changes in figure and in internal organs are not completed till several years have passed, and that they involve increased growth and demand full supplies. As less bulky food is used, care should be taken that it is sufficiently nutritious, and habits should be acquired which conduce to making the most of it for the maintenance of strength.

The nutritiveness of food depends on digestibility and concentration. Food is digestible when it yields readily its constituents to the fluids destined for their reduction to absorbable chyme. It is more or less concentrated, according as a given weight contains more or less matter capable of supporting life. The degree in which they possess these qualifications united constitutes the absolute nutritive value of alimentary matters.

The degree of effect, on the vessels influences digestibility. Tough articles incapable of being completely ground up by the teeth, remain unused, while fluids and semisuids lead the van of digestibles. The tissues of young vegetables and young animals are for this reason more digestible than old specimens. It is desirable also that the post mortem rigidity, which lasts several days in most instances, should have merged into softness before the meat is cooked, or should have been anticipated by cooking before the flesh is cold. In warm climates and exceptionally warm weather the latter course is the preferable. The diet may, especially when the feeding of the young is in question, will prefer those methods of culinary preparation which most break up the natural cohesion of the viands. And it may be noticed that the force of cohesion acts in all directions, and that it is no advantage for an article to be laterally friable if it remains strong in a longitudinal direction.

Fat interposed between the component parts of food diminishes its digestibility. It is the intestinal fat between the fasciculi of muscular fibre in beef which renders it to young persons and to dyspeptics less digestible than mutton.

A temperature above that of the body retards digestion. Meat, which is digested by the gastric juice in the stomach, has time to cool before it gets there, but macerated with its for its conversion into chyme on the salivary glands, suffers a serious loss if by reason of being too hot it cannot avail itself of the saliva supplied by the mouth. It should also be borne in mind that a temperature much above that of the body cracks the enamel of the teeth.

Excessive concentration impairs digestibility. The principal medium by which nutriment is carried through the absorbent membrane of the digestive canal is water. There is no doubt it passes more rapidly by endosmosis than anything else. The removal, then, of water is an injury to viands, and drying, salting, over-frying, over-roasting, and even over-boiling renders them less soluble in the digestive juices, and so less nutritious. A familiar illustration of this may be taken from eggs. Let an egg be lightly boiled, poached in water, custarded, or raw, and the stomach even of an invalid can bear it; but let it be baked in a pudding which requires a hot oven, or boiled hard, or otherwise submitted to a high temperature for a prolonged period, and it becomes a tasteless, leathery substance, which can be of no more use in the stomach than so much skin or hair. It is obvious then that it is mainly in a commercial point of view that articles of diet can be called nutritious in proportion to their concentration. About this there can be no question; milk adulterated from the pump is worth so much less than pure milk, and a pound of beef steak sustains a man longer than a pint of real broth.
The attainment of nutritiousness by concentration is of considerable importance to travellers and in military medicine. There are not a few strategists who attribute the success of the Germans in the war of 1870 to the easily carried and easily prepared food supplied to them by the sausage-makers of Berlin. Concentration of viands carried to excess, so as to be likely to affect the health, is usually manifested by a diminution in the secretion of urine and its condensed condition; whilst, on the other hand, if dilution is needlessly great, the action of the kidneys is excessive. Now the urine of young persons is naturally of lower specific gravity, that is, more aqueous, than that of adults. If it is found to equal in density the excretion of full growth, or if it is observed to be voided but rarely, the meals should be made more bulky, or better still, more frequent, so as not to overload the stomach.

An over-concentrated diet often induces costiveness. This should be counteracted by green vegetables and other dilute appertizing dishes, and never by purgative drugs. The habit of taking a considerable quantity and variety of fresh green vegetables has the further advantage of preventing that tendency to minor developments of scurvy which is not uncommonly found in youths nourished mainly on animal food. A softness or friability of the gums is one of the first signs of this. If the mouth bleeds after the application of a tooth brush, the use of fresh vegetables at every meal should be enforced.

The young are peculiarly liable to be affected by poisons conveyed in fluids. Their sensitive frames absorb quickly, and quickly turn to evil account such substances, even when diluted to an extent which makes them harmless to adults. The water therefore with which families, and still more with which schools are supplied, should be carefully subjected to analysis. Wherever a trace of lead is found, means should be adopted to remove the source of it; and organic products should have their origin closely accounted for, and all possibility of sewage contamination excluded. These precautions are essential, in spite of the grown-up portion of the household having habitually used the water without injury.

Fresh milk has long had a bad popular reputation as occasionally conveying fever, and in some parts of Ireland the peasantry can hardly ever be got to take it "raw." This is quite irrespective of the state of the cattle which furnishes it; no cases of disease thus communicated have ever been traced home to sick cows. It is probably always due either to adulteration with dirty water, or to the vessels being washed in that dangerous medium, or to their being exposed to air laden with elements of contagion.

Up to the period of full development the daily use of wine should be allowed only during illness and the express attendance of a medical adviser. Its habitual consumption by healthy children hastens forward the crisis of puberty, checks growth, and habituates them to the artificial sensation induced by alcohol.

"Meat, decorum.—It seems certain that the old theory of Liebig, which attributed the whole of the force exhibited in muscular movements to the oxidation of muscular tissue, is untenable. There is not enough of the material oxidised, that is to say, destroyed and carried away as urea and other nitrogenous excretions, to generate so much force, as measured by the method of Joule. On the other hand, Truets goes so far as to say that he would make out that the performance of muscular work the metamorphosis of the organized constituents of contractile tissue is not involved, and that non-nitrogenous substances alone are consumed. The prolonged feats of walking performed by the pedestrian Weston in 1876 vastly increased the amounts excreted of those elements of the urine which are derived from the oxidation of muscle and not from the destruction of contractile fibre, and the phosphates whose main source is nervous tissue, were each nearly doubled during and shortly after the extraordinary strain upon those parts of the body. As might be expected, the machinery wears away quicker when it is harder worked, and requires to be repaired immediately by an enhanced quantity of muscular material, or it will be worn beyond the power of repair. The daily supply, therefore, of digestible nitrogenous food, meat par excellence, must be increased whenever the muscular exercise is increased. In making the recent extension of railways in Sicily, the progress was retarded by the slack work done by the Sicilian navvies compared with that got through by the English gangs. The former took scarcely any meat, preferring to save the wages expended by their comrades in that way. The idea occurred to the contractor of paying the men partly in money and partly in meat; and the result was a marked increase in the amount of work executed, which brought nearly up to the British average. A mixed diet, with an increase in the proportionate quantity of meat when extra corporeal exertion is required, is the wholesomest, as well as the most economical, for all sorts of manual labourers.

It is absolutely essential that the fleshy machinery for doing work should be continuously replaced by flesh food, as it becomes worn out. Nitrogenous aliment after a few chemical changes replaces the lost muscle which has passed away in the excretions; just as the engine makes ore into steel and renews the corroded boiler plate or thinned piston. Now, as the renewal of the plate or piston is a "stimulus" to the augmented performances of the engine, so meat is a "stimulus" to augmented muscular action. Taken in a digestible form during exertion, it allows the exertion to be continued longer, with greater ease and less consequent exhaustion. According to the testimony of soldiers experimentally put through forced marches of twenty miles a day, with loads of half a hundredweight each, "meat extract" bears away the palm from the other reputed stimulants commonly compared with it (viz., rum and coffee).

"It does not put a spirit into you for a few miles only, but has a lasting effect; if I were ordered for continuous marching, and had my choice, I would certainly take the meat extract," said an unprejudiced sergeant to Dr. Parke, who was the conductor of the experiments alluded to. When the continuous repair of the muscular machinery is fully secured, the production of heat and force is most readily provided for by vegetable aliment, by reason of the large proportion of carbon which it contains. In assigning their physiological functions to the several sorts of food, nearly all the business of begetting active force should apparently be ascribed to the solid hydrocarbons, starch and fat, by their conversion into carbonic acid. It is not necessary to be acquainted with every step of the process, which in the body we confessly are taken the meat extract," said an unprejudiced sergeant to Dr. Parke, who was the conductor of the experiments alluded to. When the continuous repair of the muscular machinery is fully secured, the production of heat and force is most readily provided for by vegetable aliment, by reason of the large proportion of carbon which it contains. In assigning their physiological functions to the several sorts of food, nearly all the business of begetting active force should apparently be ascribed to the solid hydrocarbons, starch and fat, by their conversion into carbonic acid. It is not necessary to be acquainted with every step of the process, which in the body we confessly are taken for the meat extract," said an unprejudiced sergeant to Dr. Parke, who was the conductor of the experiments alluded to.

2 See Dr. Fawcett on Weston’s walk, in Lancet of Dec. 20, 1878. The urine excreted when walking bore to that excreted during rest the relation of 17 to 16, phosphoric acid to 19 to 10, lime 15 to 16, etc.

3 On the failure of the Spirit Ration to prevent Disease of 1874, by R. A. Parkes, M.D., Professor of Military Hygiene in the Army Medical School. London, 1875.
proportion; for these aliments are the most direct contributors of force. Training for athletic sports is based on the principles above enunciated. The usual time allotted to it is six weeks, and the objects to be attained in this period may be described as—

1. The removal of superfluous fat and water;
2. The increase of contractile power in the muscles,
3. Increased endurance;
4. "Wind," that is to say, a power of breathing and circulating the blood steadily in spite of exertion.

The first is aimed at by considerably adding to the daily amount of nutritious and by diminishing farmacuous and liquid food, and providing that it should be so consumed as to be fully digested. The second and third are secured by gradually increasing the demands made upon the muscles, till they have learnt to exert at will all the powers of which they are capable, and for so long a period as the nature and structure of the individual frame permits. "Wind" is improved by choosing as part of the training an exercise, such as running, which can be sustained only when the respiratory and circulating organs do their duty fairly.

As an example, the Oxford system of training for the summer boat-races may be cited. It may be considered a typical regimen for fully developing a young man's corporeal powers to fulfil the demands of an extraordinary exertion, a standard which may be modified according to the circumstances for which the training is required. It is as follows:—

**A Day's Training.**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 A.M.</td>
<td>Breakfast at 8.30 A.M.</td>
<td>Not compulsory; as little as possible.</td>
</tr>
<tr>
<td></td>
<td>Exercise in the morning</td>
<td>Underdone.</td>
</tr>
<tr>
<td>8 A.M.</td>
<td>Supper at 8.30 or 9 P.M.</td>
<td>Crust only recommended.</td>
</tr>
<tr>
<td>9 P.M.</td>
<td>Bed</td>
<td>Not always adhered to.</td>
</tr>
</tbody>
</table>

1. This is well illustrated by a remarkable feat performed on the Great Western Railway in the summer of 1872. It was necessary to move the rails from the broad to the narrow gauge on upwards of 500 miles of permanent way within a fortnight. The task was enormous, for the Great Western is one of the few English lines whose rails are laid down by bolts screwed into nuts. All these had to be unscrewed and replaced after the heavy railway was done. About 8600 men were employed, working double time, sometimes from 4 in the morning till 9 at night, and, without one being sick or drunk, they accomplished the work in the prescribed time.

2. The scheme for generating muscular power was this. The men were hatted along the line, so as not to waste their strength by coming and going, and they brought with them bacon, bread, cheese, cocoa, &c., to provide their usual meals at usual times. But they had no beer, nor alcohol in any form. A pound and a half of oatmeal and half a pound of sugar was allowed extra to each man daily, and for every gallon of 21 a cock was provided. The first thing done in the morning was to breakfast; and then the cook and his cabin started along the line till water was found convenient; a fireplace of stones was built, and the pot boiled. Oatmeal was then sprinkled into it with sugar, the Cambridge system differs very slightly, and in neither is any exaggerated severity of discipline enforced, while some latitude is permitted to peculiarities and a wish for variety, and plenty of time is left for business and social intercourse. Other plans are objectionable, from involving, without any corresponding advantage, a complete departure from the usual habits of the educated classes. For instance, according to Clasper, dinner is to be at noon, with only a light tea afterwards, and no supper. Then a country walk of four or five miles is to be taken before breakfast, and two hours row afterwards, and another hard row between dinner and tea. "Stonehenge," again, requires the time between breakfast and dinner to be spent entirely on billiards, skittles, quoits, rowing, and running, in spite of another hour's row being prescribed at 6 p.m. He also requires the aspirant for athletic honours to sleep between 10 and 11 hours. Only professionals will carry out such rules, and even they do not either benefit their health or lengthen their lives by the sacrifice. For it is notorious that "over-training" leads to a condition of system in which the sufferers describe themselves as "fallen to pieces." The most peculiar symptom is a sudden loss of voluntary power after exertion. It is sometimes called "fainting," but there is no loss of sense, and it is really relieved by liquid food. It is to the pathologist a timely warning of that consequence of overstrained muscle which constitutes paralysis scrotorum, turner's palsy, and blacksmith's palsy, and which results in fatty degeneration of the red muscular fibre. To get and to keep its health a muscle needs a constant alternation of active contraction and rest, and an enforced protraction of either one or the other leads to the loss of vital properties. The limits of an Indian fakir, voluntarily held in a strained posture, or those of a bed-ridden invalid, are equally apt to become useless. Overstrained persons are also liable to a languor and apparent weakness, which is found on examination to depend on an excessive secretion of urea by the kidneys.

3. Such are not the results, however, of the training adopted at the universities, by which it would appear that the constitution is strengthened, the intellect sharpened, and life lengthened. Dr John Morgan (University Oars, 1873), has collected statistics of the subsequent health of those who have rowed in the university races since 1829, and he finds that, whereas the average age of employment is 18 years, for these oarsmen it is forty-two years. Moreover, in the cases of death, inquiry into its causes exhibits evidence of good constitutions rather than the contrary, the causes consisting largely of fevers and accidents, to which the vigorous and active are more exposed than the sick. And thoroughly well boiled till the gruel was made. As soon as the 'shout for drink' was heard, buckets were filled and carried round with small panniers to convey the liquid to the panting mouths. The men liked it exceedingly, and learned by experience the importance of having it well cooked.

The incident may remind the reader of classical medicine of Hippocrates, who considers the culinary preparation of oatmeal panns so important that in a short treatise, *On the Treatment of Acute Disease* he devotes it to the only cookery recipe he has inserted in his works. He describes how it is to be boiled till it can swell no longer (so that it may swell no more in the stomach), how it is to be settled and strained (through a coarse cylinder) and, after the yellow liquor is removed, the residue stove and blackened, is to be washed white, and allowed to stand. He proceeds, "For sicken strong people, but if they should be the first to agree with our advanced physiologists in the opinion that overstrained muscular effort produces the same action as the extreme cases of purines and albumin in the stomach," he may still be a valuable instrument capable of special absorption, dissolved in that most essential of all nutritive substances, water.
It is not at the expense of the mind that the body is cultivated, for this roll of athletes is adorned with the names of high physical and moral renewal of the nervous system. The "vital capacity" of the lungs, as indicated by the spirometer, is reduced, showing a diminished oxidation of the blood.

The effect on a healthy man of taking with a meal such a quantity of fermented liquor as puts him at ease with himself and the world around, without untoward exhilaration, is to arrest the wear of the nervous system, especially that part employed in emotion and sensation. Just as often, then, as the zest for food is raised to its normal standard by a little wine or beer with a meal, the moderate consumer is as much really better as he feels the better for it. Where the food is as keenly enjoyed without it, the consumption of a stimulant is useless. But alcohol is not a source of force, and its direct action is an arrest of vitality.

Diet for Mental Work.—An expression of Büchner's—
"No thinking without phosphorus"—has gained an unhappily notoriety. Strictly speaking, it is a groundless assumption, for we cannot say that in an unwise living may not exist joined to any form of matter, or quite independent of matter. We certainly do not know enough of the subject to lay down such a negative statement. And if it be held to mean that the amount of phosphorus passing through the body bears a proportion to the intensity of thought, it is simply a mis-statement. A captive lion, tiger, leopard, or hare assimilates and parts with a greater amount of phosphorus than a hard-thinking man; while a beaver, noted for its powers of contrivance, excretes so little phosphorus that chemical analysis cannot find it in the excreta. All that the physiologist is justified in asserting is that for the mind to energize in a living body that body must be kept living up to a certain standard, and that for the continuous renewal of life a supply of phosphatic salts is required. The same may be said with equal justice of water, fat, nitrogen, chloride of sodium, oxygen, &c. The phosphates are wanted indeed, but wanted by the body must be kept living up to a certain standard, and that

The physiology of the action of alcohol has a very important bearing on the physical management of the mental functions. Alcohol has the power of curbing, arresting, and suspending all the manifestations of the

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1 Ohne Phosphor keim Gedenken. Kraft und Stoff, sect. 122.
nervous system, so that we feel its influence on our thoughts sooner than on any other part of the system. Sometimes it brings them more completely under our control, and steadies them; more often it confuses or disconnects them, and then breaks off our power over them altogether. When a man has tired himself by intellectual exertion, a moderate quantity of alcoholic stimulant taken with food acts as an anesthetic, stays the wear of the system which is going on, and allows the nervous force to be turned to the due digestion of the meal. But it must be followed by rest from toil, and in essence a part of the same treatment which includes rest—it is an artificial rest. To continue to labour and at the same time to take an anesthetic is a physiological inconsistency. The drug merely blunts the useful feeling of weariness, and prevents it from acting as a warning. There is no habit more fatal to a literary man than that of taking stimulants between meals; the vital powers go on wearing out more and more without their cry for help being perceived, and in the end break down irrecoverably.

As to quantity, the appetite for solid food is the safest guide. If a better dinner or supper is eaten when it is accompanied by a certain amount of fermented liquor, that is the amount most suitable; if a worse, then an excess is committed, however little be taken.

The aim of the diet should be (to quote the words of John Milton) "to preserve the body's health and beauty, to render lightsome, clear, and not lumpish obedience to the mind, to the cause of religion and our country's liberty, when it shall require from hearts in sound bodies to stand and cover their tigers at the storming of the wall of the fort," with so much the more vigor if the meal be well seasoned with stimulants and the finest "sober-stones," "amethysts." It is especially when the mind of genius is over-shadowed by the dark clouds of threaten'd insanity, of hypochondriasis, or of hysteria, that a rational mode of life preserves it. Nothing but daily exercise, temperate meals, and a punctual observance of regular hours of rest and study could have kept burning the flickering reason in poor Cowper.

As regards the proper quantity of alcohol that may be used the two following questions naturally occur—How is a man to know when he has had enough? and what are the signs of too much? The amount used to wear dark red or purple engraved gems, which they considered preservatives against excess, and called them ἀριστοτείν, "sober-stones," "amethysts." The name is now limited to the violet rock crystal, but in early times it was applied to several other stones, cut in intaglio, and worn on the fingers or the wristbands. So long as the wearer could decipher the minute works of art they bore, he had not reached excess. A more delicate test still is the appreciation of temperature by the skin; if a draught does not chill, if a hot room fails to produce the usual discomfort, the wise man knows he has exceeded and must stop at once. In short, the safest rule is that when there is a consciousness of any psychical effect at all beyond that of satisfaction at the relief of bodily weariness—that is a satisfaction as is felt on taking a good meal by a vigorous person—then the limits of moderation have been attained. On ordinary occasions of daily life, and "for the stomach's sake," no more should be taken. Each fresh drop is a step downwards to the evil results of alcohol. But to the procteur of daily temperance, festive occasions are safe and may be beneficial. A man may from time to time keep up without harm the above mentioned sense of satisfaction by digestible wine in good company without fear of getting drunk or failure of health, if he makes it a law to himself to stop as soon as he experiences any hurry of ideas or indistinctness of the senses.

**Diet of Mothers.**—During pregnancy as much care should be taken not to get too fat as is taken by an athlete training for a race. The rules for modified training explained above will afford hints on the subject, but it is not desirable to carry the process so far. There is a temptation at this time to increase the usual allowance of stimulant; alcohol is taken between meals to overcome the nausea and depression incident to the state of body. And by this mistaken expedient the nauseas gradually becomes dyspeptic vomiting. On leaving it off the sickness ceases. A mother should also remember that nearly all the alcohol she consumes mixes with her blood, which now is one with the blood of the fetus.

During lactation the most suitable drink for a mother is cow's milk, fresh and unskimmed. If it turns sour on the stomach, lime-water mixed with it not only corrects the aceness, but also supplies a valuable aid to the growing bones of the infant. In her solid dietary also milk may be fairly taken as the type of a due admixture of alimentary principles, because it is not individual growth, or the production of muscular force, but the secretion of milk, that is the object of the selection of diet.

Supposing the full diet to consist of three pounds of solid food, that will require six pints extra of uncombined aqueous fluid to make it as fluid as milk, and, to combine the nitrogenous and carbonaceous constituents in due proportion, the three pounds of solid food should consist of

- 14 oz of meat
- 13 oz of fat, butter, and sugar
- 29 oz of farmaceutical food and vegetables.
- ½ oz of salt, lime, &c.

At first, from the exhaustion consequent on childbed, from the want of exercise and of fresh air, the appetite turns against meat. Let then milk, especially boiled milk with arrowroot or the like, chicken broth, or egg custards, fill up the deficiency.

Any increase in the habitual allowance of alcohol is as unwise to this period of life as during pregnancy.

**Diet of Old Age.**—It is a remark extant from the rough times when famine was more frequent than now, that the elder a human being is the better deficiency of food is born. Old men suffer least from abstinence, and benefit therefore most from temperance in eating. Everybody who has passed the age of fifty, or thereabouts, with a fairly unimpaired constitution, will act wisely in diminishing his daily quantity of solid food. There is less demand for the materials of growth, and consequently animal food should bear a smaller proportion than heretofore to vegetable, and it is mainly in that ingredient of the diet that reduction should be effected. Neglect of this rule in declining years is often punished by gout, a disease attributable to excess of nitrogenous aliment, and for this reason common in elderly men.

In the autumn of life the advantages derived from fermented liquor are more advantageous, and the injuries it can inflict less injurious to the body than in youth. The effect of alcohol is to check the activity of destructive assimilation, to arrest that rapid flux of the substance of the frame which in healthy youth can hardly be excessive, but which in old age exhausts the vital force. Loss of appetite is as frequent and a serious symptom in old age. It usually arises from deficient formation of gastric juice, which, in common with other secretions, diminishes with years. It is best treated physiologically rather than by drugs.

**Diet vs Sickness.**—In all that has gone before health has been presupposed. The modifications necessitated by sickness are of three kinds—first the avoidance of such articles of consumption as would increase the disease under the special circumstances, although ordinarily wholesome; second, the maintenance of the functions

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2. *Hippocrates, Aphorisms.*
satisfied that To the voice and respiration, well boiled. After three days the tissues are being
when the patient spitting it.
and phosphates at the Opposite principle. An organic acid takes place. The redder and more muscular
in, either by the sufferer or his ancestors. The redder and more muscular
of strength, or tremor of the hands, or quivering in the nervous system. The redder and more muscular
acidity of the digestive functions, arrest of the digestive functions, and is subject to the future changes consequent on
that the muscles disintegrate as fast as they are being. Wine gives to the appetite, and it seems to turn
loss of material in marked cases of green sickness may
the blood. The redder and more muscular
meat is converted into heat of the blood (as taken
for the repair of his tissues, the following results may be expected, with variations dependent upon his original constitution. If the digestive solvents are weak and scanty, the excess passes through the canal in an undigested state, and is partially decomposed there. Thereon ensue all sorts of abdominal disarrangements, which, however, have the advantage of getting rid of the offending matters. If, on the other hand, the stomach secretes vigorously on being stimulated, then indeed the excess is digested and absorbed, and is subject to the future changes consequent on assimilation. An active out-of-door life neutralizes this in some measure by augmenting oxidation; much of the albumen goes to form glycogen, and acts as a fuel for the maintenance of muscular force. The balance is wasted in an unexplained way, and does not unnecessarily injure a hardy frame. The violent muscular exertion and high training needful for oxidation being inconsistent with the habits of intellectual society, a man in the prime of life who puts too much meat into a good stomach habitually retains in his blood much nitrogenous tissue. In the urine, and by the process of nitrogen excretion, which the nitrogenous waste converts itself. Uric acid in the blood has been distinctly traced as the essence of gout. Perhaps this imaginary first offender develops the full consequences; and that is the best thing that can happen, inducing greater carefulness in future diet.
These views can suggest but one line of preventive treatment. The children of gouty families should be brought up to a life of strict abstinence and muscular activity. From the earliest years vegetables and meagre soups should form a considerable portion of their dietary.
Gouty adults require meat but once in twenty-four hours. If a bill of fare should be varied from day to day, but as simple as possible at each meal. Such soups are to be eschewed, and a lemon, an infusion of herbs and pepper, bread-sauce, or a purée of vegetables, adopted in their place. Sugar at the end of meals generates an excess of organic acid, and is to be avoided; if cheese is eaten it should be new, and be best toasted and creamed.
Dilute alkaline waters containing soda, such as Apollinaris or the weaker Vichy, are a rational drink during meals; but it is probably best to keep to pure water. Those who live idle lives require no alcohol; and it should not be an habitual accompaniment to meals.
Dietetic gravel is evidence of a constitution so closely allied to gout, that nothing need be said further about its appropriate regimen.
In Bright's disease of the kidneys, in contracted liver, and in short in all degenerative lesions, alcohol has a baneful influence. Its action upon the tissues is directly the same as theirs. Moreover, if we agree with its latest expositor, Dr. Sheen, that Bright's disease is closely associated with increased arterial tension, alcohol (whose effect is also to increase tension) must be peculiarly poisonous.
For the cure of these diseases, independent of the nutrition of the rest of the body, a milk diet has been proposed, and it seems to offer a fair prospect, if the patients can be persuaded to persist in it. If an excess of uric acid, into which the nitrogenous waste converts itself. Uric acid in the blood has been distinctly traced as the essence of gout. Perhaps this imaginary first offender develops the full consequences; and that is the best thing that can happen, inducing greater carefulness in future diet.
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Chronic gout is undoubtedly due to good cheer indulged in, either by the sufferer or his ancestors. When a man day after day swallows more nutritious food than is wanted

1 Chamber's Lecture, chiefly Clinical. Lect. III.

Weak and slow digestion is a condition which enforces an

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especial care for meat and drink. The cause of the imperfection lies in a deficiency in the supply of nerve power to the stomach, so that it both secretes its solvent fluid and also rotates its contents too slowly; and the more it is inclined the slower the process. Of the mechanical means of curing such a state this is not the place to speak; but none of them will avail without the aid of a rational dietary. Time must be given to the oppressed organ to empty itself of every complete meal, and such a period of rest given as will allow of the recovery of force; or if the meals are frequent they must be very sparing. The observations of Buch (Virchow's Archiv xiv) show that a period of five hours elapses in the healthy subject before a fully filled stomach can empty itself, and in the dyspeptic the process is still longer. Whenever, therefore, the organ is loaded as healthy people rightly load it, a man should allow at least seven or eight hours to elapse before sitting down to another meal. And he must never eat till the need for food is announced by appetite. Perhaps a more generally applicable and easier obeyed law is not to make full meals at all, but to stop short at a feeling of repose, and, when that has gone off, again to take in the supply allowed by circumstances. Three moderate meals are usually sufficient to keep up the strength.

Meat should be once cooked. Mutton, feathered fowl, venison, lamb, and beef are digestible in the order they here are placed in. The more difficult dishes should have the longest time allowed to them. Of the farinaceous articles of diet, bread and biscuits are the most easily penetrated by the gastric juices, and all their preparations are safe. The best bread is the "soured," which is free from decomposing yeast. Macaroni is good if soaked till quite macerated. Pastry is difficult of solution. Vegetables are very necessary; cauliflower, Jerusalem artichokes, beetroot, French beans, soft peas, stewed celery, turnip-tops, spinach, are the most readily disposed of.

When the usual mixture of meat and vegetables is found to induce flatulence, it is a good expedient to eat vegetables only at one meal and meat and bread only at another. The principle on which this plan is based is that starch food is dissolved mainly by the alkaline saliva, whereas meat is digested by the acid gastric juice. In a vigorous person both these are copious enough to render immaterial their mutual neutralization, but when they are scanty, their separate employment is a physiological economy.

Consumption is a disease whose treatment is almost wholly medical. The conduct of a mother whose periods exhibits proof of a consumptive tendency may with propriety be put to a healthy wet nurse immediately on birth, and, on being weaned, be fed from a Channel Island cow. The milk should be boiled and then cooled down to tepidity. A small tea-spoonful of "saccharated solution of lime" may be advantageously added to each quart of milk when the coming teeth require the elements of their nutrition to be added to the diet. The rules already given for the healthy management of the young should be adhered to with unusual strictness, and any departure from them should be wholly impossible to provide for some peculiar necessity of the case according to medical advice.

In cases of consumption it is difficult to say that drugs are useless, but certainly those that come nearest to alimenta have most evidence in their favour, such as iron, cod-liver oil, and the phosphates of lime. Their effect on the appetite may be seductive, and the end must not be sacrificed to the means; that is to say, if they spoil the appetite, they must be left off. The reason for administering oil is to afford an easily assimilated basis of renewed organic growth, to take the place of the abnor-mal tendency to form tubercular matter. If anything pre-

vents its easy assimilation it is obviously useless. The use of climate in the treatment of phthisis may be tested by its dietetic action; if it improves the appetite, it is doing good, if it injures the appetite, it is doing harm.

In chronic jaundice the function of the liver is best restored by the free use of green vegetables at all meals.

Diabetes, when it has once assumed a chronic form, is never really cured, but life may be much prolonged by the employment of a diet from which sugar and starch are excluded as far as practicable, and the patient nourished on animal food. The best fare for diabetic patients is that given by Professor Bouchardat in his work Du Diabète sucré, Paris, 1832.

In functional nervous diseases, such as hysteria and hypochondria, the appetite, muscular elasticity, and mental powers will often be observed to be deficient in the early part of the day, and to recover their tone in the evening. At this latter time, therefore, it is advisable to make the principal meal.

Scurvy is a notable example of a disease of which, more than any other, the prevention depends on the adoption of a suitable diet. Its symptoms so far resemble those of general starvation that from the earliest time of its appearance in history it has been suspected that it is due to a dietary defective in some necessary ingredient, and practical observation has shown that its cause was fresh vegetables. It was found on every long voyage that the crew suffered from scurvy in proportion to the length of time they were restricted to dry food, and that they recovered rapidly as soon as they got access to a supply of succulent plants. This requisite for health is obviously the most difficult of all things to procure aboard ship, and efforts were made to find a substitute capable of marine transport. From the time of Hawkins ('1593) downwards the opinion has been expressed by all the most intelligent travellers that a substitute is to be found in the juice of fruits of the orange tribes, such as oranges, lemons, &c. But in its natural state this is expensive and troublesome to carry, so that skippers and owners for a couple of centuries found it expedient to be sceptical. The pictures of scurvy as it appeared during the 18th century are hardly credible in the extreme. But the statute of 1795, passed through the exertions of Captain Cook and Sir Gilbert Blane, has enforced the carrying of lime-juice. This invaluable preventive has shown its influence all the moredecisively by the disease still appearing occasionally under strong promoting circumstances, and to a certain extent in patients of the antidote, but so modified as to be usuallymore of the nature of a warning or demonstration than of a serious invasion. Some indeed have questioned and even denied altogether the blessings derived from the enforced use of lime-juice. But they make a very scanty show when weighed with those whom they undertake to oppose, and it is superfluous here to enter into the arguments and results of observation constituting the ponderous Report of the Committee appointed by the Lords Commissioners of the Admiralty to Enquire into the Causes of the Outbreak of Scurvy on the recent Arctic Expedition, &c., and presented to both Houses of Parliament, May 7th 1877," which seems to settle for ever the preventive powers against scurvy of the use of lime-juice.

The committee alluded to was appointed in consequence of one of those exceptional outbreaks of scurvy induced by exceptional circumstances. The ships sent on the exploring expedition of 1875 were amply provided with lime-juice, and with printed expositions of its value. During the voyage out and in the long inaction of the winter the men's health was so well preserved by general attention to

1 Sir Ed. Hawkins's Voyage, edited by Hakluyt Society, p. 60.
Dietetics

hygiene that no cases of even mild scurvy were detected; the pallor and languor and depression of spirits of some among the sailors were attributed to the want of sunlight for 142 days, and it was expected that a few days sledge travelling in the open air would revivify them. There was plenty of lime-juice aboard; but it seems that it is not to be added to the weight of provisions, which Polar sledding parties have 44 propel, by including the preservative amongst them. Sir George Nares, the commander of the expedition, cites the names of 10 admirals, 10 doctors, and 15 captains who have conducted land explorations in this fashion without it; and they returned unscathed to any serious extent. But on this recent occasion the crews seem to have been peculiarly predisposed to illnesses of scurbutic nature by the more than ordinary scarcity of fresh meat in their dietary, arising out of the deficiency of game in the extremely high latitude where they wintered. With few exceptions the whole of the crews of the "Alert" and the "Discovery" were employed in sledding, and the consequence was, that of the 122 officers and men, 59 were more or less incapacitated by scurvy, and 4 died.

The real reason for not carrying lime-juice in such expeditions is its cumber-someness. Including bottles, though in truth they are not wanted in a hard frost, it may be said that 1 lb a week for each man would have to be added to the baggage,—a serious item, no doubt. And with a view of remedying the inconvenience, medical men have long sought to discover to what constituent of the complicated mixture afforded by nature it is that owes its efficacy. In a contribution to the Medico-Chirurgical Review for 1845, Dr Parkes examined exhaustively the evidence concerning the various deficiencies in ship food as compared with fresh food which might be filled up by one or other of the components of lime-juice; and by exclusion he is led to the conclusion that the cause of scurvy is to be found in deficiency of salts whose acids form carbonates in the system, viz., citric, tarteric, acetic, lactic, and malic acids.

Though not so good as when in their natural form, because less digestible and pleasant, yet a supply of nitrates, tartrates, lactates, and malates of potash might be packed in small bulk, and, under circumstances where weight is of importance, might take the place of lime-juice. Or bolo- 

lozenge might be made of lime-juice freed from its aqueous parts and preserved with sugar. Three or four of these a day might be easily swallowed without stopping work. Before leaving the subject of maritimo scurvy, it may be suggested how useful it would be if those who sail in desolate regions were to carry seeds of aniscorbutic vegetables, which, stored broadcast in uninhabited places, would form a flora capable of saving the lives of many a wrecked or weather-bound crew.

Scurvy, as landmen see it in time of peace, amounts to little more than anaemia with a softening and bleeding condition of the gums. But it indicates the use of exactly the same preventive and remedies as the more severe complaint.

Starvation is a disease which it is a platitude to say may be prevented by diet; nevertheless there are connected with it a few peculiarities of scientific and practical interest which may not be unworthy of notice. "Inedia," as it is called in the nomenclature of diseases by the London College of Physicians, is of two kinds, arising from want of food and from want of water.

When entirely deprived of nutrition the human body is capable of supporting life under ordinary circumstances for little more than a week. In the spring of 1869 this was tried on the person of a "fasting girl" in South Wales.

The parents made a show of their child, decking her out like a bride on a bed, and asserting that she had eaten no food for two years. Some reckless enthusiasts for truth set four trustworthy hospital nurses to watch her; the Celtic obstinacy of the parents was roused, and in defence of their imposture they attempted death 63 times in eight days. Their trial and conviction for manslaughter may be found in the daily periodicals of the date; but, strange to say, the experimental physiologists and nurses escaped scot-free. There is no doubt that in this instance the unnatural quietude, the grave-like silence, and the dim religious light in which the victim was kept contributed to defer death.

One thing which remarkably prolongs life is a supply of water. Dogs furnished with as much as they wished to drink were found by M. Chossat (Sur Pimantou, Paris, 1843) to live three times as long as those who were deprived of solids and liquids at the same time. Even wetting the skin with sea-water has been found useful by shipwrecked sailors. Four men and a boy of fourteen years in the Tynwydd mine near Porth, in South Wales, in the winter of 1876-7 for ten days without food, were not only alive when released, but several of them were able to walk, and all subsequently recovered. The thorough saturation of the narrow space with aqueous vapour, and the presence of grain water in the cutting, were probably the chief preservatives,—assisted by the high temperature always found in the deeper headings of coal mines, and by the enormous compression of the confined air. Thus doubtless prevented evaporation, and retarded vital processes dependent upon oxidation. The accumu- 

lation of carbonic acid in the breathed air would also have a similar arretistic power over destructive assimilation. These prisoners do not seem to have felt any of the severer pangs of hunger, for they were not tempted to eat their candles. With the instinctive feeling that darkness adds a horror to death, they preferred to use them for light.

It is a paradoxical fact, that the supply of the stomach even from the substance of the starving individual's body should tend to prolong life. In April 1874, a case was recorded of exposure in an open boat for 32 days of three men and two boys, with only ten days provisions, exclusive of old boots and jelly-fish. They had a fight in their delirium, and one was severely wounded. As the blood was washed out he lapped it up; and instead of suffering the fatal weakness which might have been expected from the hemorrhage, he seems to have done well. Experiments have been performed by a French physiologist, M. Anselmier (Archives Gén. de Médecine, 1850, vol. I. p. 169), with the object of trying to preserve the lives of dogs by what he calls "artificial autophagy." He fed them on the blood taken from their own veins daily, depriving them of all other food, and he found that the fatal cooling incident to starvation was thus postponed, and existence prolonged. Life lasted till the emaciation had proceeded to six-tenths of the animal's weight, as in Chossat's experiments, extending to the fourteenth day, instead of ending on the tenth, as was the case with other dogs which were not bled.

These instances of the application of the art of dietetics to the treatment of disease are sufficient to show the principles which should be kept in sight. The pathology of the ailment should be considered first, then its bearing upon the digestive organs, and lastly the bearing of the digestive organs upon it.

And before quitting the subject of health as affected by diet, the common-sense hint may be given to those who are in good sanitary condition, that they cannot do better than let well alone. The most trustworthy security for future health is present health, and there is some risk of overthrowing nature's work by overcarrying.
Pleasure as an Object of Dietetics.  

The social importance of gratifying the palate has certainly never been denied in practice by any of the human race. Feasting has been adopted from the earliest times as the most natural expression of joy, and the readiest means of creating joy. If ascetics have seemed to put the pleasure away from them, they have done so in the hope of purchasing by their sacrifice something greater and nobler, and have thus tacitly conceded, if not exaggerated, its real value. Experience shows that its indulgence, unregulated by the natural laws which govern our progress in civilization, leads to unutterable degradation and meanness, brutalizes the mind, and deadens its perception of the repulsiveness of vice and crime. But that is no cause why thus powerful motive power, governed by right reason, should not be made subservient to the highest purposes.

The times of meals must be regulated with a regard to the disposal of the remainder of the day, whether that depends on choice or on necessity. Violent exertion of either mind or body retards digestion; and therefore, when this is practised, food is not called for so soon as on a day of rest. The heaviest meal should be postponed till the day's work is done; it is then that social home joys give the requisite repose to the body and mind. Light eaters may dine as late as they please, but those of larger appetite should lengthen the interval between their repast and bed-time. After the night's sleep and the long fast which has emptied the digestive canal of its nutritive contents, a breakfast should be taken before any of the real business of life be begun. It is no proof of health or vigour to forgo it without inconvenience, but it is proof of health and vigour to be able to lay in then a solid foundation for the day's labour. Not less than four and not more than six hours should elapse before the store is again replenished. A light farinaceous lunch with vegetables and fruit may be made most appetizing, and is followed by a cheerful afternoon, whereas a ponderous meal and wine meal entails heaviness of spirit.

Diet in relation to Economy.  

Due Proportion of Animal and Vegetable Food.—It has been taken for granted thus far, that the mixed fare, which has met the approval of so many generations of men, is that which is most in accordance with reason. But there are physiologists who argue that our teeth resemble those of the vegetable-feeding apes more than those of any other class of animal, and that therefore our most appropriate food must be of the fruits of the earth. And if we were devoid of the intelligence which enables us to fit food for digestion by cookery, it is probable no diet would suit us better. But our reason must not be left out of account, and it is surely quite as natural for a man to cook and eat every thing that contains in a convenient form starch, fat, albumen, fibre, and phosphorus, as it is for a monkey to eat nuts or an ox grass. The human race is naturally omnivorous. Moreover, man is able not only to develop his highest faculties and perform all his duties on any form of digestible aliment, but he is able also very much to diminish the requisite quantities by a due admixture. The diet which supplies the demand most accurately will be the most economical in the highest sense. And that this diet is a mixed one can be shown by the following method of calculation. We can measure by experiment the ultimate elements of all that is thrown off from the body as the result of vital decomposition, the ashes, the smoke, and the gases which the fire of life produces; and thus we can lay down a rule for the minimum quantity of those elements which the daily food must contain to keep up the standard weight. If the diet be such as to make it necessary to eat too much of one element in order to secure a sufficient amount of another, there is a waste, and the digestive viscera are burdened with a useless load. But there is no single article procurable for the food of the adult population which presents the exact proportion of elements required by an adult, and therefore no single article alone can supply human wants without waste.

As an example, apply this reckoning to the elements carbon and nitrogen, which constitute the main bulk of the solids in our food and in our bodies. Suppose a gang of 100 healthy prisoners to extirpate, in the shape of breathed air and evacuations, 714 lb of carbon and 44 lb of nitrogen (which is pretty nearly the actual amount of those elements in the dried solids of the secrets, as estimated by current physiological works). Both nitrogen and carbon to that extent must of course be supplied by the diet. But our teeth resemble those of the vegetable-feeding apes more than those of any other class of animal, and therefore no animal food at all is required to supply the nitrogen. But there would be to find 354 lb of lean meat in order to give the 71 lb of carbon, and thus there would be wasted 106 lb of nitrogen contained in the meat, over and above the 44 lb really required to prevent emaciation. If, on the other hand, the bread were replaced by a purely animal diet, there would have seemed 354 lb of lean meat in order to give the 71 lb of carbon, and thus there would be wasted 106 lb of nitrogen contained in the meat, over and above the 44 lb really required to prevent emaciation.

When work is undertaken, much more is actually wanted. According to Mr Vizetelly, the labourer in a Spanish vineyard consumes daily between 8 and 9 lb of vegetable food, consisting of bread, onion-porridge, and grapes. And when animal food alone is taken, as in the case of the Equinoxians, 20 lb of it a day is the usual allowance.

Now, if a mixed dietary be adopted for the gang of 100 prisoners before mentioned, 200 lb of farinaceous food, with 56 lb of animal muscle, would fulfil the requirements of the case; 2 lb of bread and a little more than 3 lb of meat a head would be enough, under ordinary circumstances, for each man's daily food.

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2 Milne-Edwards, Cours de Physiologie, vol. vi. p. 198

2 Dr Lethby's analysis given 8 1 per cent of nitrogenous matter to bread. (Lectures on Food, p. 6.) Of this 4 lb is nitrogen. Romagna's analysis of gluten gives 14 60 per cent. (Analys. de Chas. de Phys., liv. 249). M. Payen makes the proportion of nitrogen to carbon in bread as 1 to 30.

2 The proportion of nitrogen to carbon in albumen is as 1 to 3. (155 to 55 lb) by Melder's analysis, quoted in Lehmann, Phys. Chem., i. 343.) In red meat there is 74 per cent of water ( dicto in. 96).

diected to physiology a precision rarely attainable in our dealings with social economy. Mr. Joule of Manchester analyzed, about thirty years ago, the relation which the heat, used as a source of power in machinery, bore to the force of motion thus made active. He showed that raising the temperature of 1 lb of water 1° Fahrenheit, was equivalent to raising 772 lb to the height of 1 foot; and consequently, that the fall of 772 lb might be so applied as to heat 1 lb of water 1° Fahrenheit. Thus, the mechanical work represented in lifting 772 lb 1 foot, or 1 lb 772 feet, forms the "dynamic equivalent," the measure of the possible strength of 1° of temperature as marked by the thermometer in 1 lb of water. Physiologists seized eagerly on the opportunity which Joule's demonstration seemed to afford them of estimating in actual numbers the relation of living bodies to the work they have to do. So much earth raised on an embankment represents so much heat developed in the machinery, be it living or dead. The fully digested food, converted through several stages into gaseous, liquid, and solid excretory matters, produces by its chemical changes a definite amount of heat, of which a definite amount escapes and a definite amount is employed in working the involuntary machinery of the body, and the rest is available for conversation at will into voluntary muscular actions.

It may be reckoned that the daily expenditure of force in working the machinery of the body—in raising the diaphragm about 15 times and contracting the heart about 60 times a minute, in continuously rolling the wave of the intestinal canal, and in various other involuntary movements, without anything to be fairly called work,—it may be reckoned that the expenditure of force in doing this is equal to that which would raise a man of 10 stone 10,000 feet.

There are several reasons for believing that in assigning their physiological functions to the several sorts of food, nearly all the business of begetting force should be ascribed to the solid hydrocarbons, starch and oil, by their conversion into carbonate and water, just as there are good grounds for thinking that it is the conversion of the solid hydrocarbon of coal into the same substances which drives a locomotive. To the nitrogenous aliments seems allotted nearly all the business of begetting force, for the chief nitrogenous excretion, the urea, is not largely employed in working the machinery, be it living or dead. He would be knocked up by the sheer labour of keeping up the animal heat.

One of the most cogent of the reasons for this view is that the chief nitrogenous excretion, the urea, is not increased in amount in proportion to the work done, as shown by the experiments of Messrs. P. and W. whereas the excretion of carbonic acid in a decided manner follows the amount of muscular exertion. Now, it is very clear that if the supply of power to do work depended on the decomposition and renewal of the muscles by flesh food, the ures must be exactly proportioned to the exertion, which is not the case.

To give an example of the mode of working out a problem by this theory, Professor Frankland, in a series of experiments made in 1866 at the Royal Institution, and published in the London Philosophical Magazine, vol. xxxii. p. 152, ascertains with the "calorimeter" (which reckons the amount of heat evolved as a thermometer does its degree) the quantity of energy or force evolved under the form of heat during the oxidation of a given weight of alimentary substance. It has been explained that heat and mechanical work, being convertible into one another, bear a constant proportion to one another; so that a definite production of so much heat invariably represents the potentiality of so much motion, under the form and circumstances. From the reading of the calorimeter therefore may be calculated how many extra pounds ought to be raised a foot high by a man who has eaten an extra pound of the food in question; how many stone at foot high he ought to raise a weight of ten stone (say himself) before he has worked out the value of his victuals. Professor Frankland has thus estimated the comparative value of foods as bases of muscular exertion, and he has made out a table of the weight and cost of various articles that would require to be consumed daily to enable a man to support life, the equivalent of which has been already reckoned as the muscular force in action which would raise a man of 10 stone 10,000 feet.

<table>
<thead>
<tr>
<th>Name of Food</th>
<th>Weight in pounds required</th>
<th>Price per Lb</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cheshire cheese</td>
<td>1 756</td>
<td>0 10</td>
<td>0 114</td>
</tr>
<tr>
<td>Potatoes</td>
<td>5 066</td>
<td>0 1</td>
<td>0 54</td>
</tr>
<tr>
<td>Apples</td>
<td>7 815</td>
<td>0 14</td>
<td>0 114</td>
</tr>
<tr>
<td>Oatmeal</td>
<td>1 581</td>
<td>0 21</td>
<td>0 114</td>
</tr>
<tr>
<td>Flour</td>
<td>1 311</td>
<td>0 23</td>
<td>0 23</td>
</tr>
<tr>
<td>Pease meal</td>
<td>1 255</td>
<td>0 34</td>
<td>0 34</td>
</tr>
<tr>
<td>Ground rice</td>
<td>1 041</td>
<td>0 46</td>
<td>0 46</td>
</tr>
<tr>
<td>Arrowroot</td>
<td>1 097</td>
<td>1 0</td>
<td>1 35</td>
</tr>
<tr>
<td>Bread</td>
<td>2 546</td>
<td>0 4</td>
<td>1 0</td>
</tr>
<tr>
<td>Lean beef</td>
<td>2 532</td>
<td>1 0</td>
<td>0 41</td>
</tr>
<tr>
<td>Lean veal</td>
<td>4 500</td>
<td>1 0</td>
<td>0 34</td>
</tr>
<tr>
<td>Lean ham (boiled)</td>
<td>5 641</td>
<td>1 0</td>
<td>0 34</td>
</tr>
<tr>
<td>Mackerel</td>
<td>8 724</td>
<td>0 8</td>
<td>0 22</td>
</tr>
<tr>
<td>Whiting</td>
<td>6 369</td>
<td>1 4</td>
<td>9 4</td>
</tr>
<tr>
<td>White of egg</td>
<td>8 745</td>
<td>0 6</td>
<td>4 41</td>
</tr>
<tr>
<td>Hard-boiled egg</td>
<td>2 209</td>
<td>0 63</td>
<td>1 28</td>
</tr>
<tr>
<td>Insuloges</td>
<td>1 577</td>
<td>0 66</td>
<td>22 04</td>
</tr>
<tr>
<td>Milk</td>
<td>8 021</td>
<td>0 24</td>
<td>1 8</td>
</tr>
<tr>
<td>Carrots</td>
<td>10 209</td>
<td>0 1</td>
<td>1 0</td>
</tr>
<tr>
<td>Cabbage</td>
<td>1 020</td>
<td>0 1</td>
<td>1 0</td>
</tr>
<tr>
<td>Cocoa-mash</td>
<td>0 785</td>
<td>1 6</td>
<td>1 14</td>
</tr>
<tr>
<td>Butter</td>
<td>6 023</td>
<td>1 6</td>
<td>1 04</td>
</tr>
<tr>
<td>Beef fat</td>
<td>6 055</td>
<td>0 10</td>
<td>0 54</td>
</tr>
<tr>
<td>Cod-liver oil</td>
<td>5 639</td>
<td>3 6</td>
<td>1 14</td>
</tr>
<tr>
<td>Lamp snail</td>
<td>3 262</td>
<td>0 6</td>
<td>0 22</td>
</tr>
<tr>
<td>Commercial grape sugar</td>
<td>1 537</td>
<td>0 33</td>
<td>0 55</td>
</tr>
<tr>
<td>Base's pale ale (bottled)</td>
<td>9 bottles</td>
<td>0 10</td>
<td>7 6</td>
</tr>
<tr>
<td>Guinness's stout</td>
<td>61 bottles</td>
<td>0 10</td>
<td>5 74</td>
</tr>
</tbody>
</table>

After the supply of sufficient alimentary matters in the food to provide for the necessary renewal of the tissues, the best materials for the production of internal and external work are non-nitrogenous matters, such as oil, fat, sugar, starch, gum, etc. When the work is increased, not so much extra meat as vegetable food, or its dietetic equivalent, fat, is demanded.

In comparing the cost of a daily sufficiency of the various foods to produce the required force, we must not forget the inconveniences which many of them entail. These inconveniences must be added to the cost. For example, suppose a man to have been living upon potatoes only, just supporting life with 5 lb a day, and then to get work which enabled him and required him to take a double supply of non-nitrogenous food, how would it, at the price, be equivalent to carrying 12 lb extra in a vessel so ill-adapted to sustain heavy loads as the stomach. A similar objection would lie against milk, or yeast, or apples, however cheap accident might make them; and a more serious objection still would hold against nine bottles of ale, or seven of stout. On the other hand, the over-concentration of cheese, beef dripping, and lump sugar, makes them nauseous when in large quantity or monotonously persisted in, though when introduced as a variety they are appetising and digestible. There is no saving in using that against which the stomach is set, or which the absorbtions refuse to assimilate.

In a table showing the consumption of the diet of the average working man, the bulk of the food was used to maintain a man of 10 stone in London, and this would be raised a foot high by a man who has eaten an extra pound of the food in question; how many stone at foot high he ought to raise a weight of ten stone (say himself) before he has worked out the value of his victuals. Professor Frankland has thus estimated the comparative value of foods as bases of muscular exertion, and he has made out a table of the weight and cost of various articles that would require to be consumed daily to enable a man to support life, the equivalent of which has been already reckoned as the muscular force in action which would raise a man of 10 stone 10,000 feet.
Stone raised 10,000 feet — such, for instance, as carrying up
ladders, altogether 1 1/4 mile high, three tons of stone daily —
calculation would show that to add this amount of labour
to the outgoings caused by the functioning of physiological life,
would involve the addition to their spare diet of
at least 117 lb of bread, or of 58 lb of bread with
44 lb of lean meat and 63 lb of potatoes. The slightest
imperfection or undigestion of any of this would cause a
loss of bodily weight, and cases of illness would be
culpably frequent. Were a draught of milk, or a cup of
cocoa and sugar, or some oatmeal porridge and treacle, or
even a little dripping or butter or bacon given, the danger
would probably be averted.

The most conspicuous fault in the dietary of the working
classes is want of variety. Many of the articles which
combine simple nutritiousness with small cost are habitually
neglected, because when used exclusively they are disagreeable
and unwholesome. From never being eaten they
become absolutely unknown. There are many sorts of
cheap beans, vetches, and peas, unheard of except at
London needlewomen, and of that supplied during the
Lancashire cotton factories, as reported by
Dr. Pavy (Treatise on Food, p 415) —

| Quantity of Food required. | The calculations of Dr
Pavy, would allow us by another route to arrive at an estimate of
what amount of solid victuals is required by an adult
living by bodily labour to preserve his health under various
circumstances. The circumstances which chiefly affect the
question can be classified thus — (1) bare existence; (2)
moderate exercise; (3) active work; and (4) hard work.

1 The first is calculated from the mean of sundry prison
dietaries, of the convicts' diet at hospitals, of
London needlewomen, and of that supplied during the
Lancashire cotton-famme, as reported by
Mr. Simon. The result is that, in a condition of low health, without activity,
2 1/2 ounces of nitrogenous food, 1 ounce of fat, 12 ounces
of starch, and 1/3 of an ounce of mineral matters a day
are necessary. The amount of carbon in this is equal to
7-14 ounces. In other words, a man's life will be shortened
or burdened by disease in the future, or he will die of
gradual starvation, unless his provision for a week
is equivalent to 3 lb of meat with 1 lb of fat on it, or
with the same quantity of butter or lard, two quarter loaves
of bread, and about an ounce of salt and other condiments.
If he cannot get meat, he must supply its place with as
least 2 1/2 quarter loaves of bread, or about 12 oz
of potatoes, or between 5 and 6 lb of oatmeal,—unless he
is, indeed, so fortunate as to be able to get skim milk, of
which 5 pints a week will replace the meat.

A person reduced to bare existence diet can undertake
no habitual toil, mental or bodily, under the penalty of
breaking down.

"Bare existence" diet is that which requires to be
estimated for administration to certain classes of the
community who have a claim on their fellow-countrymen
that their lives and health shall be preserved in statu quo,
but nothing further. Such are prisoners, paupers, or the
members of a temporarily famine stricken community.

It would be obviously unjust to apply the same scale of
quantity and quality to all persons under varying circumstances
of constitution and outward surroundings; and to
attempt to feed in the same way all these people for short
or long periods, unless one can show that such a tone of stone and a half
of potatoes, or between 5 and 6 lb of oatmeal — unless he
is, indeed, so fortunate as to be able to get skim milk, of
which 5 pints a week will replace the meat.

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or long periods, unless one can show that such a tone of stone and a half
of potatoes, or between 5 and 6 lb of oatmeal — unless he
is, indeed, so fortunate as to be able to get skim milk, of
which 5 pints a week will replace the meat.

The nutritive value of the first named diet is thus calculated
by Dr. Pavy (Treatise on Food, p 415) —

<table>
<thead>
<tr>
<th>Nitrogenous matters</th>
<th>1 900 oz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbohydrates</td>
<td>8 784 oz</td>
</tr>
<tr>
<td>Fat</td>
<td>1 506 oz</td>
</tr>
<tr>
<td>Mineral matter</td>
<td>0 073 oz</td>
</tr>
</tbody>
</table>

Total of dry solids 26 200 oz.

This is about half of what an average man requires to
sustain himself without work, and under its discipline he
would probably lose 3 or 4 ounces of his weight daily till
his bodily substance was reduced by six-tenths, at which
period, according to Chossat's experiments, he would die.

"Penal diet" is that which is apportioned for more
protracted punishment. It may be continued for three months.
It consists of 20 oz. of bread, 8 oz. of oatmeal, 20 oz.
of milk, and 16 oz. of potatoes daily. Its chemical constituents
are as follows: —

<table>
<thead>
<tr>
<th>Nitrogenous matters</th>
<th>3 784 oz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbohydrates</td>
<td>19 804 oz</td>
</tr>
<tr>
<td>Fat</td>
<td>1 506 oz</td>
</tr>
<tr>
<td>Mineral matter</td>
<td>0 073 oz</td>
</tr>
</tbody>
</table>

Total of dry solids 26 200 oz.

Upon this diet a fair amount of work may be done. The
consumption of the carbohydrates evokes sufficient force to
cause a ton 4193 feet; and thus the effete muscular substance
may be worn off by destructive assimilation, making place for new muscle derived from the nitrogenous matter
of which a bare sufficiency, but yet probably a sufficiency,
is supplied. A man of strong constitution is usually found
at the end of it to be in good health and of normal weight.

1 Lecture delivered at the Royal Institution, London, April 28, 1865.
yet he has never probably experienced the content which arises from a famine—consumption of food. It is intended to deny him the normal pleasure of the accumulation of reserve-forces in the gastric region. This pleasurable sensation under ordinary circumstances much promotes digestion, so that the whole of the ingesta are made the best use of, and therefore in “penal diet,” as above quoted, it has been found expedient to introduce the slight excess to be noticed above what is needful to accomplish the required work in “foot-togs” (see before). The penalty of the regimen involves a certain degree of waste.

A close imitation of “penal diet” is that which the duty of a responsible Government demands should be served out during a temporary famine, that is, one calculated not to last above three months. It is more economical to introduce the elements of variety in the diet than to be too monotonous,—that is, to save in the daily issue and to be occasionally liberal, to feast from time to time as a break in the regular fast. The expense of the excess is more than replaced by the diminished habitual ration, and that powerful preservative of life, anticipation of pleasure, is brought into play. A reduction of the allowance below what experience has indicated as “bare existence diet,” made during the famines in Madras in the beginning of 1877, was attended with disastrous results.

Out of mixing and varying his diet and making it consist of very nutritious articles, such as bread, meat, yolk of eggs and soup, Signor Cornaro (see Cornaro) succeeded in reducing the quantity he daily consumed to as little as 12 oz. (Venetian). But then he made the solids go much farther by taking 14 oz. of good wine. And the probability is that this gentleman had a peculiar constitution, for, in spite of his many readers, he has had no imitators of the experiment on their own persons.

2 The appropriate food of the second class may be fairly represented by the dietaries of European soldiers in time of peace. The English soldier on home service, according to Dr Parkes, receives from Government 5$\frac{1}{2}$ lb of meat and 7 lb of bread weekly, and buys additional bread, vegetables, milk, and groceries out of his pay. Such a diet is sufficient for anybody under ordinary circumstances of regular light occupation; but should extra demands be made upon mind or body, weight is lost, and if the demands continue to be made the health will suffer. Mr F. Buckland, surgeon in the Guards, remarks (Soc. of Arts Journal, 1863, quoted by Dr Playfair) that though the sergents in the Guards fallten upon their rations, the quantity is not enough for recruits during their drill.

The Russian conscript is allowed weekly1:

<table>
<thead>
<tr>
<th>Weekly Allowance</th>
<th>Nitrogenous matter</th>
<th>Carbohydrates</th>
<th>Fat</th>
<th>Mineral matter</th>
<th>Total water-fraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 lb of bread</td>
<td>13 lb</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 oz.</td>
<td>1 oz.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>244 gals</td>
<td>244 gals</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 oz.</td>
<td>6 oz.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>90 oz.</td>
<td>90 oz.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100 oz.</td>
<td>100 oz.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1752 oz.</td>
<td>1752 oz.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 Report of Sanitary Commissioner, 1858, p. 425, quoted by Dr Parkes.
D I E T E T I C S

Vinegar and other vegetable acids are too much neglected by our handycraftsmen and soldiers. The Carthaginians are stated by Aristotle to have used vinegar as a substitute for wine during their campaigns, and the recipes given by Cato for flavouring vinegar with fruits show that it was in use among the labouring population in Italy.

3. "Active" Labourers are those who get through such an amount of work daily, exclusive of Sundays, as may be represented by a walk of 20 miles. In this class are soldiers during a campaign, letter carriers, and engineers employed on field work or as artisans. These habitually consume on the average about a fifth more nitrogenous food and twice as much fat as the last class, while the quantity of vegetable hydrocarbons is not augmented, except in the Royal Engineers.

The "hard labour diet" of convict prisons fairly represents what the authorities consider the minimum. It is the same as that already described as "industrial unemployment diet," with the following additions.—barley, 1 oz.; bread, 20 oz.; salt for soup, 8 oz.; carrots, 1 oz.; onions, 1/2 oz.; turnips, 1 oz. It contains, however, 14 oz. less milk, and 1 oz. less "meat."

The nutritive value of the additions may be seen by Dr Pavy's analytical study, which is as follows—

<table>
<thead>
<tr>
<th>Weekly Additions</th>
<th>Nitrogen matter</th>
<th>Carbohydrate</th>
<th>Fat</th>
<th>Minerals</th>
<th>Total water-free matter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barley</td>
<td>0.062</td>
<td>0.718</td>
<td>0.024</td>
<td>0.020</td>
<td>0.850</td>
</tr>
<tr>
<td>Bread</td>
<td>2.000</td>
<td>1.630</td>
<td>0.320</td>
<td>0.450</td>
<td>12.680</td>
</tr>
<tr>
<td>Beans</td>
<td>0.000</td>
<td>1.658</td>
<td>0.032</td>
<td>0.023</td>
<td>4.080</td>
</tr>
<tr>
<td>Carrots</td>
<td>1.000</td>
<td>0.018</td>
<td>0.145</td>
<td>0.022</td>
<td>0.800</td>
</tr>
<tr>
<td>Onions</td>
<td>0.000</td>
<td>0.006</td>
<td>0.038</td>
<td>0.003</td>
<td>0.045</td>
</tr>
<tr>
<td>Turnips</td>
<td>0.000</td>
<td>0.012</td>
<td>0.072</td>
<td>0.000</td>
<td>0.080</td>
</tr>
<tr>
<td>Total water-free matter</td>
<td>3.402</td>
<td>11.279</td>
<td>0.666</td>
<td>0.571</td>
<td>17.915</td>
</tr>
</tbody>
</table>

From these totals must be deducted the articles cut off—

<table>
<thead>
<tr>
<th>Weekly Deductions</th>
<th>Nitrogen matter</th>
<th>Carbohydrate</th>
<th>Fat</th>
<th>Minerals</th>
<th>Total water-free matter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk</td>
<td>1.000</td>
<td>0.574</td>
<td>0.246</td>
<td>0.112</td>
<td>1.000</td>
</tr>
<tr>
<td>Meat</td>
<td>1.000</td>
<td>0.278</td>
<td>0.154</td>
<td>0.030</td>
<td>0.460</td>
</tr>
<tr>
<td>Total water-free matter</td>
<td>0.850</td>
<td>0.728</td>
<td>0.700</td>
<td>0.142</td>
<td>2.420</td>
</tr>
</tbody>
</table>

The same food is given summer and winter, though the demand must be greater to provide for the extra quantity of heat required to be produced in cold weather. But then the amount of work is diminished at the latter season by 12 hours, which is equivalent to an augmentation of the diet. The additions are more judicious than those made by the classes above mentioned who partly furnish their own food; for bread and vegetables constitute a large portion of the convict ration, and the extra quantity of soup replaces the lost milk, without risk of the waste in cooking common when the uneducated deal with solid meat.

4. "Hard work" is that got through by English navvies, hard-worked weavers, and blacksmithe, &c which is more earnest and intense than the enforced "hard labour" of the convict. It is difficult to obtain accurate information, but it would appear from Dr Playfair's estimates that the customary addition to the diet is entirely in nitrogenous constituents. The higher their wages the more meat the men eat.

The neglect of vegetables by the last two classes is in a physiological point of view imputable, and possibly may be a contributing cause of an inordinate thirst for alcohol which impovershes and degrades many among them. To satisfy their insatiable hunger for a hydrocarbon, they take one convenient indeed in some respects, but of which any excess is unwholesome. The discovery already mentioned of the production of forces from the assimilation of starch leads to a knowledge, opposed to old prejudices but supported by experience, that the raising of the energies to their full height of usefulness may be effected by vegetable food quite as well as by the more stimulating and more expensive animal nutriment, or by the more rapidly absorbed alcohol.

With regard to the tables quoted above in which ultimate analyses are used as data for dietary rules, it must be noticed that their authors depurate arguments being founded on any but the very broadest characters of the articles analyzed. Specimens, even when of the highest quality, differ strangely from one another. Season, soil, modes of culture, the variations of species, and many other little known influences come into play and prevent our taking the market names of articles as representatives of a definite chemical constitution. And it may be added that ample scope should be allowed for the peculiarities of the individual and of his life-history. In the application of general rules some one must be trusted to relax or strain them when circumstances require, or failures of a total character may occasionally result, and more often a galling perversion of justice.

Estimates for the thrifty management of food-supply have usually reference to the feeding of others rather than to the calculation of a man's own diet. Enough has been said on that point under the head of the influence of diet upon health, and if a person really wants to bring down the expense of feeding himself to the lowest point, he can readily rate himself under one of the classes enumerated above, and act accordingly. It may, however, be doubted whether it is wise to reduce the diet to the minimum which the work requires. The certain evils of an accidental deficiency or of a miscalculation are so serious that the danger outweighs the possible inconvenience of a slight excess. It were an authority thrifl which indeed would imperil the vigour of mind and body to effect a pecuniary saving, for there is no investment so remunerative as high health. A man need not consider that he is wasteful when he spends money upon making his bill of fare palatable and provocative to the extent of moderate superfluity. Pleasure and prudence here walk hand in hand.

DIEITRIC, CHRISTIAN WILHELM ERISS (1712-1774), was born at Wemar, where he was brought up early to the profession of art by his father Johann George, then painter of miniatures to the court of the grand duke. Being sent to Dresden to perfect himself under the care of Alexander Thiele, he had the good fortune to finish in two hours, at the age of eighteen, a picture which attracted the attention of the king of Saxony. Augustus II. was so pleased with Dietrich's readiness of hand that he gave him means to study abroad, and visit in succession the chief cities of Italy and the Netherlands. There he learnt to copy and to imitate masters of the previous century with a versatility truly surprising. Winkelmann, to whom he had been recommended, did not hesitate to call him the Raphael of landscapes. Yet in this branch of his practice he merely imitated Salvator Rosa, Roos, and Everdingen. He was more successful in applying the style of Rembrandt, and numerous examples of this talent may be found in the galleries of St Petersburg, Vienna, and Dresden. At Dresden, indeed, there are pictures acknowledged to be his, bearing the fictitious dates of 1636 and 1638, and the name of Rembrandt. Among Dietrich's cleverest reproductions we may account that of Ostade's manner in the Teniers Painters at the National Gallery. His skill in catching the character of the later masters of Holland is shown in candle-light scenes, such as the Squire and the
Deep Show at St. Petersburg, where we are easily reminded of Godfried Schalcke. Dietrich tried every branch of art except portraits, painting Italian and Dutch views alternately with Scripture scenes and still life. In 1741 he was appointed court painter to August III. at Dresden, with an annual salary of 400 thalers (260), conditional on the production of four cabinet pictures a year. The condition, no doubt, accounts for the presence of 52 of the master's panels and canvases in one of the rooms at the Dresden museum. These pieces enable the spectator, if careless of more serious occupation, to study the numerous varieties of a changing style. It is needless, perhaps, to add that Dietrich, though popular and probably the busiest artist of his time, never produced anything of his own; and his imitations are necessarily inferior to the originals which he affected to copy. His best work is certainly that which he gave to engravings. A copious collection of these at the British Museum, produced on the general lines of life and in his acknowledged style, and Rembrandt, reveal both spirit and skill. Dietrich, after his return from the Peninsula, generally signed himself “Dietercy,” and with this signature most of his extant pictures are inscribed. His death took place at Dresden, after he had successfully filled the important appointments of director of the school of painting at the Meissen porcelain factory and professor of the Dresden academy of arts.

DIEZ, FRIEDRICH CHRISTIAN (1794-1876), the founder of Romance philology, was born at Giessen, in Hesse-Darmstadt, March 15, 1794, and died at Bonn, May 29, 1876. He was educated first at the gymnasium and then at the university of his native town. There he studied classics under Weiker, who had just returned from a two years’ residence in Italy to fill the chair of archæology and Greek literature. It was Wecker who kindled in him a love of Italian poetry, and thus gave the first bent to his genius. In 1815 he joined the Hessian corps as a volunteer and served in the French campaign. Next year he returned to his books, and this short taste of military service was the only break in a long and uneventful life of literary labours. By his parents’ desire he applied himself for a short time to law, but a visit to Goethe in 1818 gave a new direction to his studies, and determined his future career. Goethe had been reading Raynouard’s Selections from the Romance Poets, and advised the young scholar to explore the rich mines of Provençal literature which the French savant had opened up. Thus advice was eagerly followed, and henceforth Diez devoted himself to Romance literature. After supporting himself for some years by private teaching, he removed in 1829 to Bonn, where he held the position of privat-docent, which is the lowest grade of the German professoriate. In 1829 he published his first work, An Introduction to Romance Poetry; in the following year appeared The Poetry of the Troubadours, and in 1829 The Lives and Works of the Troubadours. In 1830 he was called to the chair of modern literature. The rest of his life was chiefly occupied with the composition of the two great works on which his fame rests, the Grammar of the Romance Languages, 1835-1844, and the Lexicon of the Romance Languages—Italian, Spanish, and French, 1853.

In these two works Diez has done for the Romance group of languages what Jacob Grimm has for the Teutonic family. In both cases much remains to be accomplished, many words and forms are not yet accounted for, some errors have already been pointed out, but all future philologists must build on the foundations which these two men have laid. “Nothing,” says Max Muller, “can be a better preparation for the study of the comparative grammar of the ancient Aryan language than a careful perusal of the comparative grammars of the six Romance languages by Professor Diez.”

In order to appreciate the importance of Diez’s work it is necessary to take a rapid glance at the history of philology in France. The earliest philologists, such as Perion and Henri Estienne, sought to discover the origin of French in Greek and even in Hebrew. For more than a century Ménage’s Etymological Dictionary held the field without a rival. Considering the time at which it was written (1550), it was a meritorious work, but philology was then in the empirical stage, and many of Ménage’s derivations (such as that of “rat” from the Latin “mus,” or of “haricot” from “faba”) have since become by-words among philologists. A great advance was made by Raynouard, who by his critical editions of the works of the Troubadours, published in the first years of the present century, laid the foundations on which Diez afterwards built. The difference between Diez’s method and that of his predecessors is well stated by him in the preface to his dictionary. In sum it is the difference between science and guess-work; and it consists in the principle and method of Diez being to follow implicitly the discovered principles and rules of philology, and not to swerve a foot’s breadth from them unless plain, actual exceptions shall justify it; to follow the genius of the language, and by cross-questioning to elicit its secrets; to gauge each letter and estimate the value which attaches to it in each position; and lastly to possess the true philochic spirit which is prepared to welcome any new fact, though it may modify or upset the most cherished theory.

Such is the historical method which Diez pursues in his grammar and dictionary. To collect and arrange facts is, as he tells us, the sole secret of his success, and he adds in other words the famous aphorism of Newton, “hypotheses non fingo.”

The introduction to the grammar consists of two parts:—the first discusses the Latin, Greek, and Teutonic elements common to the Romance languages, the second treats of the six dialects separately, their origin, and the elements peculiar to each. The grammar itself is divided into four books, on phonology, on flexion, on the formation of words by composition and derivation, and on syntax.

His dictionary is divided into two parts. The first contains words common to two at least of the three principal groups of Romance,—Italian, Spanish and Portuguese, and Provençal and French. The Italian, as nearest the original, is placed at the head of each article. The second part treats of words peculiar to one group. There is no separate glossary of Wallachian.

Of the introduction to the grammar there is an excellent translation into French by Gauthier, a pupil of Diez, and an English translation by C. H. Cayler. The dictionary has been published in a remodelled form for English readers by T. C. Donkin. A second edition, enlarged and corrected, appeared in 1861, and a third edition was begun in 1869.

DIFFERENTIAL CALCULUS. See INFINITESIMAL CALCULUS.

DIFFUSION. Some liquids, such as mercury and water, when placed in contact with each other do not mix at all; but the surface of separation remains distinct, and exhibits the phenomena described under CAPILLARY ACTION. Other pairs of liquids, such as chloroform and water, mix, but only in certain proportions. The chloroform takes up a little water, and the water a little chloroform; but the two mixed liquids will not mix with each other, but remain in contact separated by a surface showing capillary phenomena. The two liquids are then in a state of equilibrium with each other. The conditions of the equilibrium of heterogeneous substances have been investigated by Professor J. Willard Gibbs in a series of papers published in the Transactions of the Connecticut Academy of Arts and Sciences, vol. ii., part i. p. 108. Other pairs of liquids, and all gases, mix in all proportions.
When two fluids are capable of being mixed, they cannot remain in equilibrium with each other; if they are placed in contact with each other the process of mixture begins of itself, and goes on till the state of equilibrium is attained, which in the case of fluids which mix in all proportions, is a state of uniform mixture. This process of mixture is called diffusion. It may be easily observed by taking a glass jar half full of water and pouring a strong solution of a coloured salt, such as sulphate of copper, through a long-stemmed funnel, so as to occupy the lower part of the jar. If the jar is not disturbed we may trace the process of diffusion for weeks, months, or years, by the gradual rase of the colour into the upper part of the jar, and the weakening of the colour in the lower part.

Thus, however, is not a method capable of giving accurate measurements of the composition of the liquid at different depths in the vessel. For more exact determinations we may draw off a portion from a given stratum of the mixed liquid, and determine its composition either by chemical methods or by its specific gravity, or any other property from which its composition may be deduced.

But as the act of removing a portion of the fluid interferes with the process of diffusion, it is desirable to be able to ascertain the composition of any stratum of the mixture without removing it from the vessel. For this purpose Sir W. Thomson places in the jar a number of glass beads of different densities, which indicate the densities of the strata in which they are observed to float. The principal objection to this method is that, if the liquids contain air or any other gas, bubbles are apt to form on the glass beads, so as to make them float in a stratum of less density than that marked on them.

M. Vost has observed the diffusion of cane sugar in water by passing a ray of plane-polarized light horizontally through the vessel, and determining the angle through which the plane of polarization is turned by the solution of sugar. This method is of course applicable only to those substances which cause rotation of the plane of polarized light.

Another method is to place the diffusing liquids in a hollow glass prism, with its refracting edge vertical, and to determine the deviation of a ray of light passing through the prism at different depths. The ray is bent downwards on account of the variable density of the mixture, as well as towards the thicker part of the prism, but by making it pass near the edge of the prism as possible, the deviation of the ray may be made very small, and by placing the prism within a vessel of water having parallel sides of glass, we can get rid of the constant part of the deviation, and are able to use a prism of large angle, so as to increase the part due to the diffusing substance. At the same time we can more easily control and regulate the temperature.

The laws of diffusion were first investigated by Graham. The diffusion of gases has recently been observed with great accuracy by Loschmidt, and that of liquids by Fick and by Vost.

Diffusion is a molecular motion.—If we observe the process of diffusion with our most powerful microscopes, we cannot follow the motion of any individual portions of the fluids. We cannot point out one place in which the lower fluid is ascending, and another in which the upper fluid is descending. There are no currents visible to us, and the motion of the material substance goes on as imperceptibly as the conduction of heat or of electricity. Hence the motion which constitutes diffusion must be distinguished from those motions of fluids which we can trace by means of floating motes. It may be described as a motion of the fluids, not in mass, but by molecules.

When we reason upon the hypothesis that a fluid is a continuous homogeneous substance, it is comparatively easy to define its density and velocity, but when we admit that it may consist of molecules of different kinds, we must revolve the definitions. We therefore define these quantities by considering that part of the medium which at a given instant is within a certain small region surrounding a given point. This region must be so small that the properties of the medium as a whole are sensibly the same throughout the region, and yet it must be so large as to include a large number of molecules. We then define the density of the medium at the given point as the mass of the medium within this region divided by its volume, and the velocity of the medium as the momentum of this portion of the medium divided by its mass.

If we consider the motion of the medium relative to an imaginary surface supposed to exist within the region occupied by the medium, and if we define the flow of the medium through the surface as the mass of the medium which in unit of time passes through unit area of the surface, then it follows from the above definitions that the velocity of the medium resolved in the direction of the normal to the surface is equal to the flow divided by the density. If we suppose the surface itself to move with the same velocity as the fluid, and in the same direction, there will be no flow through it.

Having thus defined the density, velocity, and flow of the medium as a whole, or, as it is sometimes expressed, "in mass," we may now consider one of the fluids which constitute the medium, and define its density, velocity, and flow in the same way. The velocity of this fluid may be different from that of the medium in mass, and its flow relative to that of the medium is the velocity of diffusion which we have to study.

Diffusion of Gases according to the Kinetic Theory

So many of the phenomena of gases are found to be explained in a consistent manner by the kinetic theory of gases, that we may describe with considerable probability of correctness the kind of motion which constitutes diffusion in gases. We shall therefore consider gaseous diffusion in the light of the kinetic theory before we consider diffusion in liquids.

A gas, according to the kinetic theory, is a collection of particles or molecules which are in rapid motion, and which, when they encounter each other, behave pretty much as elastic bodies, such as billiard balls, would do if no energy were lost in their collisions. Each molecule travels at a very small distance between one encounter and another, so that it is everywhere and then altering its velocity both in direction and magnitude, and that in an exceedingly irregular manner.

The result is that the velocity of any molecule may be considered as compounded of two velocities, one of which, called the velocity of the medium, is the same for all the molecules, while the other, called the velocity of agitation, is irregular both in magnitude and in direction, though the average magnitude of the velocity may be calculated, and any one direction is just as likely as any other.

The result of this motion is, that in any part of the medium the molecules are more numerous than in a neighboring region, more molecules will pass from the first region to the second than in the reverse direction, and for this reason the density of the gas will tend to become equal in all parts of the vessel containing it, except in so far as the molecules may be crowded towards one direction by the action of an external force such as gravity. Since the motion of the molecules is very swift, the process of equalization of density in a gas is a very
rapid one, its velocity of propagation through the gas being that of sound.

Let us now consider two gases in the same vessel, the proportion of the gases being different in different parts of the vessel, but the pressure being everywhere the same. The agitation of the molecules will still cause more molecules of the first gas to pass from places where that gas is dense to places where it is rare than in the opposite direction, but since the second gas is dense where the first one is rare, its molecules will be for the most part travelling in the opposite direction. Hence the molecules of the two gases will encounter each other, and every encounter will act as a check to the process of equalization of the density of each gas throughout the mixture.

The interdiffusion of two gases in a vessel is therefore a much slower process than that by which the density of a single gas becomes equalized, though it appears from the theory that the final result is the same, and that each gas is distributed through the vessel in precisely the same way as if no other gas had been present, and this even when we take into account the effect of gravity.

If we apply the ordinary language about fluids to a single gas of the mixture, we may distinguish the forces which act as on an element of volume as follows.---

1st. Any external force, such as gravity or electricity.

2d. The difference of the pressure of the particular gas on opposite sides of the element of volume. (The pressure due to other gases is to be considered of no account)

3d. The resistance arising from the perplexity of the gas which are moving with different velocity.

The resistance due to encounters with the molecules of any other gas is proportional to the velocity of the first gas relative to the second, to the product of their densities, and to a coefficient which depends on the nature of the gases and on the temperature.

The equations of motion of one gas of a mixture are therefore of the form

\[ \frac{d^2 x}{dz^2} + D \frac{dx}{dz} \]

where the symbol of operation \( \frac{d}{dz} \) prefixed to any quantity denotes the time-variation of that quantity at a point which moves along with that medium which is distinguished by the suffix \( (i) \), or more explicitly

\[ \frac{d}{dt} \left( \frac{dx}{dz} \right) + u \frac{dx}{dz} + v \frac{dx}{dz} + w \frac{dx}{dz} \]

In the state of ultimate equilibrium \( u \rightarrow w \rightarrow \cdots \rightarrow 0 \), and the equation is reduced to

\[ \frac{d^2 x}{dz^2} - X p_i = 0 \]

which is the ordinary form of the equations of equilibrium of a single fluid. Hence, when the process of diffusion is complete, the density of each gas at any point of the vessel is the same as if no other gas were present.

If \( V \) is the potential of the force which acts on the gas, and if in the equation \( \frac{d^2 x}{dz^2} + D \frac{dx}{dz} \), the solution of which is

\[ \frac{d^2 x}{dz^2} + k \frac{dx}{dz} \]

the solution of which is

\[ p_i = k \frac{d^2 x}{dz^2} \]

Hence if, as in the case of gravity, \( V \) is the same for all gases, but \( k \) different for different gases, the composition of the mixture will be different in different parts of the vessel, the proportion of the heavier gases, for which \( k \) is smaller, being greater at the bottom of the vessel than at the top. It would be difficult, however, to obtain experimental evidence of this difference of composition except in a vessel more than 100 metres high, and \( k \) would be necessary to keep the vessel free from inequalities of temperature for more than a year, in order to allow the process of diffusion to advance to a state even half-way towards that of ultimate equilibrium.

The important question might now be made up in a few minutes by placing a tube, say 10 centimetres long, on a whirling apparatus, so that one end shall be close to the other, while the other is moving at a rate, say, of 60 metres per second. Thus if equal volumes of hydrogen and carbonic acid were used, the proportion of hydrogen to carbonic acid would be about \( \frac{1}{2} \), greater at the end of the tube nearest the axis. The experimental verification of the result is important, as it establishes a method of effecting the partial separation of gases without the selective action of chemical agents.

Let us next consider the case of diffusion in a vertical cylinder. Let \( m \), be the mass of the first gas in a column of unit area extending from the bottom of the vessel to the height \( z \), and let \( v_i \) be the volume which this mass would occupy at unit pressure, then

\[ k \frac{m_i}{m} = m_i \]

and the equation of motion becomes

\[ \frac{d^2 x}{dz^2} + \frac{dx}{dz} = \frac{c}{k} \frac{dx}{dz} + \frac{d}{dz} \frac{dx}{dz} + \frac{d^2 x}{dz^2} \]

If we add the corresponding equations together for all the gases, we find that the terms in \( C_{ij} \) destroy each other, and that if the medium is not affected with sensible currents the first term of each equation may be neglected. In ordinary experiments we may also neglect the effect of gravity, so that we get

\[ \frac{d^2 x}{dz^2} = \frac{d}{dz} \frac{dx}{dz} \]

or

\[ \frac{d^2 x}{dz^2} = p \frac{dx}{dz} \]

where \( p \) is the uniform pressure of the mixed medium. Hence

\[ dV_i = -dV \]

and the equation becomes

\[ dV_i = \frac{C_{ik}}{k_i} \frac{dV_i}{dz} \]

an equation, the form of which is identical with the well-known equation for the conduction of heat. We may write it

\[ \frac{d^2 x}{dz^2} - D \frac{dx}{dz} \]

D is called the coefficient of diffusion. It is equal to

\[ \frac{C_{ik}}{k_i} \]

It therefore varies inversely as the total pressure of the medium, and if the coefficient of resistance, \( C_{ik} \), is independent of the temperature, it varies directly as the product \( k_i k_j \), i.e., as the square of the absolute temperature. It is probable, however, that the effect of temperature is not so great as this would make it.

In liquids \( D \) probably depends on the proportion of the ingredients of the mixed medium as well as on the temperature. The dimensions of \( D \) are \( L^2 T^{-1} \), where \( L \) is the unit of length and \( T \) the unit of time.

The values of the coefficients of diffusion of several pairs of gases have been determined by Loschmidt.\(^{1}\) They are referred in the following table to the centimetre and the second as units, for the temperature 0°C and the pressure of 76 centimetres of mercury.

<table>
<thead>
<tr>
<th>Gas</th>
<th>( D ) (cm²/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbonic acid and air</td>
<td>0.1823</td>
</tr>
<tr>
<td>Carbonic acid and hydrogen</td>
<td>0.5588</td>
</tr>
<tr>
<td>Oxygen and hydrogen</td>
<td>0.7314</td>
</tr>
<tr>
<td>Carbonic acid and oxygen</td>
<td>0.1109</td>
</tr>
<tr>
<td>Carbonic acid and carbonic oxide</td>
<td>0.1408</td>
</tr>
<tr>
<td>Carbonic acid and nitrous oxide</td>
<td>0.1588</td>
</tr>
<tr>
<td>Sulphuric acid and hydrogen</td>
<td>0.0988</td>
</tr>
<tr>
<td>Oxygen and carbonic oxide</td>
<td>0.1862</td>
</tr>
<tr>
<td>Carbonic oxide and hydrogen</td>
<td>0.6422</td>
</tr>
</tbody>
</table>

**Diffusion in Liquids.**

The nature of the motion of the molecules in liquids is less understood than in gases, but it is easy to see that if there is any irregular displacement among the molecules in a mixed liquid, it must, on the whole, tend to cause each component to pass from places where it forms a large proportion of the mixture to places where it is less abundant. It is also manifest that any relative motion of two constituents of the mixture will be opposed by a resistance arising from

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\(^{1}\) Imperial Academy of Vienna, 10th March 1870.
the encounters between the molecules of these components. The value of this resistance, however, depends, in liquids, on more complicated conditions than in gases, and for the present we must regard it as a function of all the physical properties of the mixture at the given place, that is to say, its temperature and pressure, and the proportions of the different components of the mixture.

The coefficient of interdiffusion of two liquids must therefore be considered as depending on all the physical properties of the mixture according to laws which can be ascertained only by experiment.

Thus Fick has determined the coefficient of diffusion for common salt in water to be 0.0000116, and Volt has found that of cane-sugar to be 0.0000056.

It appears from these numbers that in a vessel of the same size the process of diffusion of liquids requires a greater number of days to reach a given stage than the process of diffusion of gases in the same vessel requires seconds.

When we wish to mix two liquids, it is not sufficient to place them in the same vessel, for if the vessel is small, a metre in depth, the lighter liquid will be at the denser, and it will be many years before the mixture becomes even seemingly uniform. We therefore stir the two liquids together, that is to say, we move a solid body through the vessel, first one way, then another, so as to make the liquid contents eddy about in as complicated a manner as possible. The effect of this is that the two liquids, which originally formed two thick horizontal layers, one above the other, are now disposed in thin and excessively convoluted strata, which, if they could be spread out, would cover an immense area. The effect of the stirring is thus to increase the area over which the process of diffusion can go on, and to diminish the distance between the diffusing liquids; and since the time required for diffusion varies as the square of the thickness of the layers, it is evident that by a moderate amount of stirring the process of mixture which would otherwise require years may be completed in a few seconds. That the process is not instantaneous is easily ascertained by observing that for some time after the stirring the mixture appears full of streaks, which cause it to lose its transparency. This arises from the different indices of refraction of different portions of the mixture which have been brought near each other by stirring. The surfaces of separation are so drawn out and convoluted, that the whole mass has a woolly appearance, for no ray of light can pass through it without being turned many times out of its path.

Graham observed that the diffusion both of liquids and gases takes place through porous solid bodies, such as plugs of plaster of Paris or plates of pressed plumago, at a rate not very much less than when no such body is interposed, and that even when the solid partition is amply sufficient to check all ordinary currents, and even to sustain a considerable difference of pressure on its opposite sides.

But there is another class of cases in which a liquid or a gas can pass through a diaphragm, which is not, in the ordinary sense, porous. For instance, when carbonic acid gas is confined in a soap bubble it rapidly escapes. The gas is absorbed at the inner surface of the bubble, and forms a solution of carbonic acid in water. This solution diffuses from the inner surface of the bubble, where it is strongest, to the outer surface, where it is in contact with air, and the carbonic acid evaporates and diffuses out into the atmosphere. It is also found that hydrogen and other gases can pass through a layer of caoutchouc. Graham showed that it is not through pores, in the ordinary sense, that the motion takes place, for the rates are determined by the chemical relations between the gases and the caoutchouc, or the liquid film.

According to Graham's theory, the caoutchouc is a colloid substance,—that is, one which is capable of combining, in a temporary and very loose manner, with indeterminate proportions of other substances, just as glue will form a jelly with various proportions of water. Another class of substances, which Graham called crystalloid, are distinguished from these by being always of definite composition, and not admitting of these temporary associations. When a colloid body has in different parts of its mass different proportions of water, alcohol, or solutions of crystalloid bodies, diffusion takes place through the colloid body, though no part of it can be shown to be in the liquid state.

On the other hand, a solution of a colloid substance is almost incapable of diffusion through a porous solid, or another colloid body. Thus, if a solution of gum and salt in water is placed in contact with a solid jelly of gelatine and alcohol, alcohol will be diffused into the gum, and salt and water will be diffused into the gelatine, but the gum and the gelatine will not diffuse into each other.

There are certain metals whose relations to certain gases Graham explained by this theory. For instance, hydrogen can be made to pass through iron and palladium at a high temperature, and carbonic oxide can be made to pass through iron. The gases form colloidal unions with the metals, and are diffused through them as water is diffused through a jelly. Root has lately found that hydrogen can pass through platinum, even at ordinary temperatures.

By taking advantage of the different velocities with which different liquids and gases pass through parchment paper and other solid bodies, Graham was enabled to effect many remarkable analyses. He called this method the method of Dialysis.

**Diffusion and Evaporation, Condensation, Solution, and Absorption.**

The rate of evaporation of liquids is determined principally by the rate of diffusion of the vapour through the air or other gas which lies above the liquid. Indeed, the coefficient of diffusion of the vapour of a liquid through air can be determined in a rough but easy manner by placing a little of the liquid in a test tube, and observing the rate at which its weight diminishes by evaporation day by day. For at the surface of the liquid the density of the vapour is that corresponding to the temperature, whereas at the mouth of the test tube the air is nearly pure. Hence, if the pressure of the vapour corresponding to the temperature, and $p = kp$, and if $m$ be the mass evaporated in time $t$, and diffused into the air through a distance $A$, then

$$D = \frac{4m}{p t}.$$

This method is not, of course, applicable to vapours which are rarer than the superheated gas.

The solution of a salt in a liquid goes on in the same way, and so does the absorption of a gas by a liquid.

These processes are all accelerated by currents, for the reason already explained.

The processes of evaporation and condensation go on much more rapidly when no air or other non-condensible gas is present hence the importance of the air-pump in the steam engine.

**Relation between Diffusion of Matter and Diffusion of Heat.**

The same motion of agitation of the molecules of gases which causes two gases to diffuse through each other also

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1. A should be taken equal to the height of the tube above the surface of the liquid, together with about $\frac{1}{2}$ of the diameter of the tube. — See Clerk Maxwell's *Electricity*, Art. 509.
causes two portions of the same gas to diffuse through each other, although we cannot observe this kind of diffusion, because we cannot distinguish the molecules of one portion from those of the other when they are once mixed. If, however, the molecules of one portion have any property whereby they can be distinguished from those of the other, then that property will be communicated from one part of the medium to an adjoining part, and that either by convection—that is by the molecules themselves passing out of one part into the other, carrying the property with them—or by transmission—that is by the property being communicated from one molecule to another during their encounters. The chemical properties by which different substances are recognized are inseparable from their molecules, so that the diffusion of such properties can take place only by the transference of the molecules themselves, but the momentum of a molecule in any given direction and its energy are also properties which may be different in different molecules, but which may be communicated from one molecule to another. Hence the diffusion of momentum and that of energy through the medium can take place in two different ways, whereas the diffusion of matter can take place only in one of these ways.

In gases the great majority of the particles, at any instant, are describing free paths, and it is therefore possible to show that there is a simple numerical relation between the coefficients of the three kinds of diffusion,—the diffusion of matter, the lateral diffusion of velocity (which is the phenomenon known as the internal friction or viscosity of fluids), and the diffusion of energy (which is called the conduction of heat). But in liquids the majority of the molecules are engaged at close quarters with one or more other molecules, so that the transmission of momentum and of energy takes place in a far greater degree by communication from one molecule to another, than by convection by the molecules themselves. Hence the ratios of the coefficient of diffusion to those of viscosity and thermal conductivity are much smaller in liquids than in gases.

Theory of the Wet Bulb Thermometer.

The temperature indicated by the wet bulb thermometer is determined in great part by the relation between the coefficients of diffusion and conduction. As the water evaporates from the wet bulb heat must be supplied to it by convection, conduction, or radiation. This supply of heat will not be sufficient to maintain the temperature constant till the temperature of the wet bulb has sunk so far below that of the surrounding air and other bodies that the flow of heat due to the difference of temperature is equal to the latent heat of vaporization of the water which leaves the bulb.

The use of the wet bulb thermometer as a means of estimating the humidity of the atmosphere was employed by Hutton and Lea, but the formula by which the dew-point is commonly deduced from the readings of the wet and dry thermometers was first given by Dr. Apljohn. Dr. Apljohn assumes that, when the temperature of the wet bulb is stationary, the heat required to convert the water into vapour is given out by portions of the surrounding air in cooling from the temperature of the atmosphere to that of the wet bulb, and that the air thus cooled becomes saturated with the vapour which it receives from the bulb.

Let $m$ be the mass of a portion of air at a distance from the wet bulb, $\theta$ its temperature, $p_0$ the pressure due to the aqueous vapour in it, and $P$ the whole pressure.

If $\sigma$ is the specific gravity of aqueous vapour (referred to air), then the mass of water in this portion of air is $\frac{m}{\sigma}$. The quantity of vapour which has been communicated to the air is

\[
(P_0 - P) \times \frac{m}{\sigma}.
\]

and if $L$ is the latent heat of vapour at the temperature $\theta_0$, the quantity of heat required to produce this vapour is

\[
(P_0 - P) \times \frac{m}{\sigma} L.
\]

According to Appian's theory, the heat is supplied by the mixed air and vapour in cooling from $\theta$ to $\theta_0$.

If $S$ is the specific heat of the air (which will not be sensibly different from that of dry air), this quantity of heat is

\[
(S_0 - S_0) m S.
\]

Equating the two values we obtain

\[
P_0 = p_0 = \frac{p_0}{L} (\theta - \theta_0).
\]

Here $p_0$ is the pressure of the vapour in the atmosphere. The temperature—by which this is the maximum pressure—is the dew-point, and $p_0$ is the maximum pressure corresponding to the temperature $\theta_0$ of the wet bulb. Hence this formula, combined with tables of the pressure of aqueous vapour, enables us to find the dew-point from observations of the wet and dry bulb thermometers.

We may call this the convection theory of the wet bulb, because we consider the temperature and humidity of a portion of air brought from a distance to be affected directly by the wet bulb without communication either of heat or of vapour with other portions of air.

Dr. Everett has pointed out as a defect in this theory, that it does not explain how the air can either sink in temperature or increase in humidity unless it comes into absolute contact with the wet bulb. Let us, therefore, consider what we may call the conduction and diffusion theory in calm air, taking into account the effects of radiation.

The steady conduction of heat is determined by the conditions

\[
\theta = \theta_0 \text{ at a great distance from the bulb},
\]

\[
\theta = \theta_0 \text{ at the surface of the bulb},
\]

\[
\psi = 0 \text{ at any point of the medium}.
\]

The steady diffusion of vapour is determined by the conditions

\[
p - p_0 \text{ at a great distance from the bulb},
\]

\[
p - p_0 \text{ at the surface of the bulb},
\]

\[
\psi r = 0 \text{ at any point of the medium}.
\]

Now, if the bulb had been an electric conductor, the conditions with respect to the potential would have been

\[
V = 0 \text{ at a great distance},
\]

\[
V = V_1 \text{ at the surface},
\]

\[
V r = 0 \text{ at any point outside the bulb}.
\]

Hence the solution of the electrical problem leads to that of the other two. For if $V$ is the potential at any point,

\[
\psi = \psi_0 + (\psi_1 - \psi_0) V / V_1
\]

\[
E = CV^2 = \int \int \int \frac{dV}{d\rho} ds
\]

where the double integral is extended over the surface of the bulb, and $d\rho$ is an element of a normal to the surface.

If $H$ is the flow of heat in unit of time from the bulb,

\[
H = - E \int \int \int \frac{dV}{d\rho} ds,
\]

and if $Q$ is the flow of aqueous vapour from the bulb,

\[
Q = - D \int \int \int \frac{d\rho}{d\phi} ds,
\]

where $k$ is the ratio of the pressure of aqueous vapour to its density.

If $C$ is the electrical capacity of the bulb, $E = CV_1$,

\[
H = - 4\pi CE (\psi_1 - \psi_0), \quad Q = 4\pi C D (P_0 - P_0).
\]

The heat which leaves the bulb by radiation to external objects at temperature $\theta_0$ may be written

\[
A = AR(\psi_1 - \psi_0),
\]

where $A$ is the surface of the bulb and $R$ the coefficient of radiation of unit of surface.

When the temperature becomes constant

\[
L + H + k + k = 0,
\]

\[
p_0 = p_0 = \frac{L}{D} + k = 4\pi CE (\psi_1 - \psi_0).
\]

This formula gives the result of the theory of diffusion, conduc-
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tion, and radiation in a still atmosphere. It differs from
the formula of the convection theory only by the factor in the last
term.

The first part of this factor is $\frac{R}{D}$ and certainly less than unity, and
probably about 77.

If the bulb is spherical and of radius $r$, $A = 4\pi r^2$ and $C = r$, so
that the second part is $\frac{C}{R}$.

Hence, the larger the wet bulb, the greater will be the ratio of
the effect of radiation to that of conduction. If, on the other hand, the
bulb is motion, this will increase both conduction and diffu-
sion, so as to increase the ratio of the first part to the second. By
comparing actual observations of the dew-point with a formula,
it has been found that the factor should be somewhat
greater than unity. According to our theory it ought to be
greater if the bulb is larger, and smaller if there is much wind.

Relation between Diffusion and Electrolytic Conductation.

Electrolysis (see separate article) is a molecular movement
of the constituents of a compound liquid in which, under
the action of electromotive force, one of the components
travels in the positive and the other in the negative direc-
tion, the flow of each component, when reckoned in electro-
chemical equivalents, being in all cases numerically equal
to the flow of electricity.

Electrolysis resembles diffusion in being a molecular
movement of two currents in opposite directions through
the same liquid; but since the liquid is of the same com-
position throughout, we cannot ascribe the currents to the
molecular agituation of a medium whose composition varies
from one part to another as in ordinary diffusion, but we
must ascribe it to the action of the electromotive force on
particles having definite charges of electricity.

The force, therefore, urging an electro-chemical equiva-
 lent of either component, or $\textit{ion}$, as it is called, in a given
direction is numerically equal to the electromotive force at a
given point of the electrolyte, and is therefore comparable
with any ordinary force. The resistance which prevents
the current from rising above a certain value is that arising
from the encounters of the molecules of the ion with other
molecules as they struggle forward through the liquid, and
depends on their relative velocity, and also on the
nature of the ion, and of the liquid through which it has to flow.

The average velocity of the ions will therefore increase,
till the resistance they meet with is equal to the force
which urges them forward, and they will thus acquire a
definite velocity proportional to the electric force at the
point, but depending also on the nature of the liquid.

If the resistance of the liquid and the passage of the ion
is the same for different strengths of solution, the velocity
of the ion will be the same for different strengths, but the
quantity of it, and therefore the quantity of electricity
which passes in a given time, will be proportional to the
strength of the solution.

New, Kohlrausch has determined the conductivity of the
solutions of many electrolytes in water, and he finds
that for very weak solutions the conductivity is propor-
tional to the strength. When the solution is strong the
liquid through which the ions struggle can no longer be
considered sensibly the same as pure water, and conse-
quently this proportionality does not hold good for strong
solutions.

Kohlrausch has determined the actual velocity in cen-
tinestes per second of various ions in weak solutions
under an electro-motive force of unit value. From these
values he has calculated the conductivities of weak
solutions of electrolytes different from those of which he
made use in calculating the velocity of the ions, and he
finds the results consistent with direct experiments on those
electrolytes.

It is manifest that we have here important informa-
tion as to the resistance which the ion meets with in
travelling through the liquid. It is not easy, however,
to make a numerical comparison between this resistance
and any results of ordinary diffusion, for, in the first
place, we cannot make experiments on the diffusion of ions.
Many electrolytes, indeed, are decomposed by the
current into components, one or both of which are capa-
cible of diffusion, but these components, when once sepa-
rated out of the electrolyte, are no longer ions—they are
no longer acted on by electric force, or charged with
definite quantities of electricity. Some of them, as the
metals, are insoluble, and therefore incapable of diffusion,
others, like the gases, though soluble in the liquid elec-
trlyte, are not, when in solution, acted on by the current.

Besides this, if we accept the theory of electrolysis
proposed by Clausius, the molecules acted on by the elec-
romotive force are not the whole of the molecules which form
the constituents of the electrolyte, but only those which at
a given instant are in a state of dissociation from molecules
of the other kind, being forced away from them tempo-
arily by the violence of the molecular agitation. If these
so-called dissociated molecules form a small proportion of the whole,
the velocity of their passage through the medium must
be much greater than the mean velocity of the whole, which is
the quantity calculated by Kohlrausch.

On Processes by which the Mixture and Separation of
Fluids can be effected in a Reversible Manner.

A physical process is said to be reversible when the
material system can be made to return from the final state
to the original state under conditions which at every stage
of the reverse process differ only infinitesimally from the
conditions at the corresponding stage of the direct process.
All other processes are called irreversible.

Thus the passage of heat from one body to another is a
reversible process if the temperature of the first body
exceeds that of the second by an infinitesimal quantity,
but that of the reverse process differs only infinitesimally from the
conditions at the corresponding stage of the direct process.
In general a process of which the temperature of one body to
the second is not a reversible process, for the temperature of one or both of the bodies
must be altered by a finite quantity before the heat can
be made to flow back again from the second body to first.

But if the temperature of the first body is higher than
that of the second by a finite quantity, the passage of
heat from the first body to the second is not a reversible
process, for the temperature of one or both of the bodies
must be altered by a finite quantity before the heat can
be made to flow back again.

In like manner the interdiffusion of two gasses is in
general an irreversible process. For in order to separate the
two gasses the conditions must be very considerably
changed. For instance, if carbolic acid is one of the gasses,
we can separate it from the other by means of quicklime;
but the absorption of carbolic acid by quicklime.

At ordinary temperatures and pressures is an irreversible process,
for in order to separate the carbolic acid from the
lume it must be raised to a high temperature.

In all reversible processes the substances which are in
contact must be in complete equilibrium throughout the
process, and Professor Gibbs has shown the condition of
equilibrium to be that not only the temperature and the
pressure of the two substances must be the same, but also
that the potential of each of the component substances
must be the same in both compounds, and that there is
an additional condition which we need not here specify.
tare to the temperature, or to the temperature to the mixture, in such a manner that the conditions of the system differ only by inessential quantities at the corresponding stages of the direct and the inverse processes. The same thing may be done at lower temperatures by means of potash or soda.

If one of the gases can be condensed into a liquid, and if during the condensation the pressure is increased or the temperature diminished so slowly that the liquid and the vapour are always very nearly in equilibrium, the separation and mixture of the gases can be effected in a reversible manner.

The same can be done by means of a liquid which absorbs the gases in different proportions, provided that we can maintain such conditions as to temperature and pressure as shall keep the system in equilibrium during the whole process.

If the densities of the two gases are different, we can effect their partial separation by a reversible process which does not involve any of the actions commonly called chemical. We place the mixed gases in a very long horizontal tube, and we raise one end of the tube till the tube is vertical. If this is done so slowly that at every stage of the process the distribution of the two gases is sensibly the same as it would be at the same stage of the reverse process, the process will be reversible, and if the tube is long enough the separation of the gases may be carried to any extent.

In the Philosophical Magazine for 1876, Lord Rayleigh has investigated the thermodynamics of diffusion, and has shown that if two portions of different gases are given at the same pressure and temperature, it is possible, by mixing them by a reversible process to obtain a certain quantity of work. At the end of the process the two gases are uniformly mixed, and occupy a volume equal to the sum of the volumes they occupied when separate, but the temperature and pressure of the mixture is lower than before.

The work which can be gained during the mixture is equal to that which would be gained by allowing first one gas and then the other to expand from its original volume to the sum of the volumes, and the fall of temperature and pressure is equal to that which would be produced in the mixture by taking away a quantity of heat equivalent to this work.

If the diffusion takes place by an irreversible process, such as goes on when the gases are placed together in a vessel, no external work is done, and there is no fall of temperature or of pressure during the process.

We may arrive at this result by a method which, if not so instructive as that of Lord Rayleigh, is more general, by the use of the physical quantity called by Clausius the entropy of the system.

The entropy of a body in equilibrium is a quantity such that it remains constant if no heat enters or leaves the body, and such that in general the quantity of heat which enters the body is equal to

\[ \delta q / s, \]

where \( \sigma \) is the entropy, and \( s \) the absolute temperature.

The entropy of a material system is the sum of the entropy of its parts.

In reversible processes the entropy of the system remains unchanged, but in all irreversible processes the entropy of the system increases.

The increase of entropy involves a diminution of the available energy of the system, that is to say, the total quantity of work which can be obtained from the system. Thus is expressed by Sir W. Thomson the declaration that a certain amount of energy is dissipated.

The quantity of energy which is dissipated in a given process is equal to

\[ \delta q (s - s_0), \]

where \( q \) is the entropy at the beginning, and \( s_0 \) that at the end of the process, and \( s_0 \) is the temperature of the system in its ultimate state, when no more work can be got out of it.

When we can determine the ultimate temperature we can calculate the amount of energy dissipated by any process; but it is sometimes difficult to do this, whereas the increase of entropy is determined by the known states of the system at the beginning and end of the process.

The entropy of a volume \( v_1 \) of gas at pressure \( p \), and temperature \( T \), is given by its entropy where its volume is \( v_1 \) and its temperature \( T_1 \), by the quantity

\[ \log \left( \frac{v_1}{v_0} \right) + \log \left( \frac{T}{T_1} \right) + \frac{2.303}{R} \log \frac{p}{p_0}, \]

where \( v_0 \) and \( T_0 \) are the volume and temperature of the gas when it is at the same pressure as the volume \( v_1 \) and temperature \( T_1 \). Hence if volumes \( v_1 \) and \( v_2 \) of two gases at the same temperature and pressure are mixed so as to occupy a volume \( v_1 + v_2 \) at the same temperature and pressure, the entropy of the system increases during the process by the quantity

\[ \frac{p}{v_0} \log \left( \frac{v_1}{v_0} \right) + \frac{p}{v_2} \log \left( \frac{v_2}{v_0} \right). \]

Since in this case the temperature does not change during the process, we may calculate the quantity of energy dissipated by multiplying the gain of entropy by the temperature, and we thus find for the dissipation

\[ \frac{p}{v_1} \log \left( \frac{v_1}{v_0} \right) + \frac{p}{v_2} \log \left( \frac{v_2}{v_0} \right), \]

or the sum of the work which would be done by the two portions of gas if each expanded under constant temperature to the volume \( v_1 + v_2 \).

It is greatest when the two volumes are equal, in which case it is

\[ \frac{1}{360} p, \]

where \( p \) is the pressure and \( v \) the volume of one of the portions.

Let us now suppose that we have in a vessel two separate portions of gas of equal volume, and at the same pressure and temperature, with a movable partition between them. If we remove the partition the agitation of the molecules will carry them from one side of the partition to the other in an irregular manner, till ultimately the two portions of gas will be thoroughly and uniformly mixed together. This motion of the molecules will take place whether the two gases are the same or different, that is to say, whether we can distinguish between the properties of the two gases or not.

If the two gases are such that we can separate them by a reversible process, then, as we have just shown, we might gain a definite amount of work by allowing them to mix under certain conditions; and if we allow them to mix by ordinary diffusion, this amount of work is no longer available, but is dissipated for ever. If, on the other hand, the two portions of gas are the same, then no work can be gained by mixing them, and no work is dissipated by allowing them to diffuse into each other.

It appears, therefore, that the process of diffusion does not involve dissipation of energy if the two gases are the same, but that it does if they can be separated from each other by a reversible process.

Now, when we say that two gases are the same, we mean that we cannot distinguish the one from the other by any known reaction. It is not probable, but it is possible, that two gases derived from different sources, but hitherto supposed to be the same, may hereafter be found to be different, and that a method may be discovered of separating them by a reversible process. If this should happen, the process of interdiffusion which we had formerly supposed not to be an instance of dissipation of energy would now be recognized as such an instance.

It follows from this that the idea of dissipation of energy depends on the extent of our knowledge. Available energy is energy which we can direct into any desired channel. Dissipated energy is energy which we cannot lay hold of and direct at pleasure, such as the energy of the confused agitation of molecules which we call heat. Now, confusion, like the correlative term order, is not a property of material things in themselves, but only in relation to the mind which perceives them. A memorandum-book does not, provided it is neatly written, appear confused to an illiterate person, or to the owner who understands it thoroughly, but to any other person able to read it appears to be inextricably confused. Similarly the notion of dissipated energy could not occur to a being who could not perceive any of the energies of his own account, or to one who could trace the motion of every molecule and sense it at the right moment. It is only to a being in the intermediate stage, who can lay hold of some forms of
energy while others elude his grasp, that energy appears to be passing inevitably from the available to the dissipated state.

DIGBY, Sir Kenelm (1603–1655), an eminent English physical philosopher, born at Gothurst, Bucking- hamshire, on the 11th July 1603, was descended from an ancient and illustrious family. His great-grandfather had distinguished himself at Bosworth on the side of Henry VII.; and his father, Sir Everard Digby, was one of the leading Roman Catholic gentry at the time of the Gunpowder Plot. Having risen in arms on that occasion, Sir Everard was executed at London, January 27, 1606. The young philosopher was educated by his guardians in the Protestant faith. Having finished his education at Oxford, he went abroad in 1621, and travelled in France, Spain, and Italy. On his return he was knighted, and received from Charles I. the appointments of gentleman of the bed-chamber, commissioner of the navy, and governor of Trinity House. At the head of a small squadron, which he equipped at his own expense, he sailed in 1628 against the Algerines, and afterwards defeated the Venetians near the port of Scanderoon. During a brief stay in Paris he joined the Church of Rome. Having returned to England in 1638, he espoused the cause of the king, and was imprisoned in Winchester House, by order of the Parliament. He was, however, liberated at the request of the French queen dowager in 1643, and retired to France, where he was taken into the confidence of the court, and enjoyed the friendship of Descartes and other learned men. Here he wrote his Treatise on the Nature of Bodies, his Treatise on the Soul, Perpetual Meditations, and other works. He visited England, after the defeat of the Royalist party, but the Parliament refused to allow him to remain. Banished from England upon pain of death if he returned, he resumed his residence in France, where he was treated with the highest respect, and was intrusted with an embassy to several of the courts of Italy. He returned again to his native country during the Protectorate of Cromwell, and seemed to be more zealous for the advancement of the interests of the Commonwealth than befitted a to the interests of the Commonwealth than befitted a

The Alimentary Canal is a tube about 28 feet long, which traverses almost the entire length of the axial part of the body. In man and all other vertebrates, it lies in relation to the ventral surface of the body of the vertebrate. It commences on the face at the orifice of the mouth, and terminates on the surface of the lower part of the trunk at the orifice of the anus. It is divided into a series of segments, or compartments, which communicate with each other, from above downwards, in the longitudinal axis of the canal. These compartments are named mouth, pharynx, oesophagus, stomach, small intestine (subdivided into duodenum, jejunum, and ileum), and large intestine (subdivided into cecum, colon, and rectum). The canal is lined by a mucous membrane, called the alimentary mucous membrane, which is continuous with the nasal mucous membrane, with the respiratory mucous membrane, and at the anal and oral orifices with the integument. Outside this mucous membrane is the submucous coat, and external to it is the muscular wall of the canal. By the contraction of the muscular wall the food is propelled along the canal from above downwards. Opening on the surface of the mucous membrane are the orifices of the ducts of numerous glands, the secretions of which, mingling with the food, act chemically on it, so as to render it soluble and capable of being absorbed.

The Mouth, Oral Cavity, or Bucal Cavity, is the dilated mouth commencement of the alimentary canal, in which the food is masticated and muddled with the secretion of the salivary and mucous glands. It is situated in the face, and extends from the lips in front to the pharynx behind. It is bounded above by the hard and soft palate, with the uvula, below by the lower jaw, the mucous membrane of the floor of the mouth, and the tongue; on each side by the cheek, and in front by the lips, between which is the aperture of communication with the surface of the face. Below it freely communicates with the pharynx through the vestibule of the nose.

The muscles situated in the lips, cheeks, floor of the mouth, tongue, and soft palate enter into the formation of the walls of the mouth.

The mouth is lined by a red-coloured mucous membrane, which becomes continuous posteriorly with that of the pharynx, and at the margins of the lips with the skin of the face. The mucous membrane covering the alveolar portions of the jaws, and surrounding the necks of the teeth, is called the gum. From the outer surface of each jaw it is reflected to the inner surface of the cheeks and lips. From the inner surface of the lower jaw the mucous membrane is reflected to the floor of the mouth, and a broad band,
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called *fronsum linguae,* is prolonged to the middle line of the under surface of the tongue.

In its structure the mucous lining of the mouth consists of a stratified pavement epithelium, and a sub-epithelial fibro-vascular corium, possessing numerous vascular papillae. The mucous membrane of the gum is characterized by its density and toughness, due to the numerous strongly developed bundles of connective tissue in the corium, many of which are continued into the fibrous tissue of the periosteum, which covers the alveolar surface of the jaw.

The free surface of the corium of the gum possesses numerous broad papillae, and is covered by a stratified pavement epithelium similar to that in the lips and cheeks. The mucous membrane of the hard palate is also tense and tough, though not so much so as the gum; and the fibrous fasciculi of its corium blend with the connective tissue of the subjacent periosteum. The mucous lining of the mouth is a sensitive membrane, and receives its nervous supply from the fifth cranial nerves.

The mucous membrane of the mouth is especially modified on the dorsum of the tongue, in the interval between the circumvallate papillae and the epiglottis, and in the substance of the tonsils, by the development of collections of fibro-vascular corium, possessing numerous vascular epithelium density and toughness, due on the dorsum of the tongue, in the interval between the lymphoid tissue in the sub-epithelial connective tissue.

The Tonsils are two almond-shaped bodies, situated, one on each side of the posterior orifice of the mouth, in the fossa between the anterior and posterior pillars of the soft palate. Their normal size is not bigger than a hazel nut, but they are very apt to enlarge, grow inwards across the posterior aperture of the mouth, and diminish the size of that opening. The free surface is marked by several rounded holes, leading into shallow pits or crypts, which may be either simple or branched, in the substance of the tonsil. The pits are lined with the epithelial covering of the mucous membrane, into which minute papillae project. In the sub-epithelial connective tissue of the walls of the crypts numerous follicles of lymphoid tissue are situated, and lymph cells are infiltrated in great numbers in the connective tissue between the follicles. Interspersed amongst the crypts are small racemose mucous glands. The tonsils are very vascular, and capillary blood-vessels are distributed in connection with the papillae, the lymphoid tissue, and the racemose glands. The tonsillar veins form a plexus in relation to the attached surface of the tonsil.

**Glands of the Mouth.**—The ducts of numerous glands, engaged in secreting mucus and saliva, open on the free surface of the mucous membrane of the mouth. Their secretion not only keeps the mouth moist, but is very apt to enlarge, grow inwards across the posterior aperture of the mouth, and diminish the size of that opening. The free surface is marked by several rounded holes, leading into shallow pits or crypts, which may be either simple or branched, in the substance of the tonsil. The pits are lined with the epithelial covering of the mucous membrane, into which minute papillae project. In the sub-epithelial connective tissue of the walls of the crypts numerous follicles of lymphoid tissue are situated, and lymph cells are infiltrated in great numbers in the connective tissue between the follicles. Interspersed amongst the crypts are small racemose mucous glands. The tonsils are very vascular, and capillary blood-vessels are distributed in connection with the papillae, the lymphoid tissue, and the racemose glands. The tonsillar veins form a plexus in relation to the attached surface of the tonsil.

**Mucous and Salivary Glands of the Mouth.**—The ducts of numerous glands, engaged in secreting mucus and saliva, open on the free surface of the mucous membrane of the mouth. Their secretion not only keeps the mouth moist, and aids therefore in articulation, but by mingling with the food assists in mastication, deglutition, and the digestive process. Each gland is characterized by being divided into small lobules, and by possessing a duct or ducts, which branch off in an arborescent manner in the substance of the gland, and finally end in the minute lobules. They all belong to the compound racemose group of glands.

The mucous glands of the mouth are situated beneath its mucous lining in the following localities:—

- (a) **labial glands,** in the upper and lower lips, but absent at the angles of the mouth; (b) **buccal glands,** scattered on the inner surface of the cheek from the lips to the opening of the parotid duct; (c) **palatine glands,** on the oral surface of the hard palate, in the uvula, on both surfaces of the soft palate, and in the tonsil; (d) **molar glands,** close to the last lower molar tooth, on each side; (e) **lingual glands,** extending backwards from the tip of the tongue along its margin, and also on its dorsum between the circumvallate papillae and epiglottis.

The ducts of these mucous glands consist of a delicate membrane lined by a single layer of columnar epithelial cells. The terminal branches of the ducts which enter the lobules and in a series of saccular dilatations, the *acinis,* *alveolii,* or gland-vesicles, which contain rounded or polygonal secreting cells. A collection of such vesicles forms a lobule. The lobules are bound together by intermediate connective tissue, in which the blood-vessels divide into a capillary network, that ramifies on the outer surface of the delicate membrane forming the wall of the gland-vesicles.

The salivary glands of the mouth are the parotid, sub-maxillary, and sublingual glands. The **parotid gland** is the largest salivary gland, and occupies the parotid hollow between the lower jaw and the external ear. Its anterior border overlaps the masseter muscle, and the excretory duct emerges out of this border. A prolongation of gland substance, the *socia parotidis,* frequently accompanies the duct for a short distance. The excretory duct of the gland, called *Stensen's duct,* passes forwards superficial to the masseter muscle, then pervades the cheek, and opens on its inner surface opposite the second upper molar tooth. The duct is between 2 and 3 inches long, and about the thickness of a crow-quill. The **submaxillary gland** is situated immediately below the lower jaw. The excretory duct of the gland, called *Wharton's duct,* runs forwards and opens on the floor of the mouth by the side of the frenum linguae. The **sublingual** is the smallest of the salivary glands, and lies under the mucous membrane of the floor of the mouth, close to the frenum linguae. It possesses from ten to twenty small excretory ducts, the *ducts of Biseaux,* some of which join Wharton's duct, though the greater number open directly on the floor of the mouth near the frenum linguae.

**Structure.**—The ducts of the salivary glands branch and terminate in the lobules,—each terminal duct ending in a series of saccular dilatations, the *acinis,* *alveolii,* or gland-vesicles, the wall of which, formed apparently of a membrana propria, is continuous with the simple membranous wall of the terminal duct. The terminal ducts are lined by a layer of squamous epithelium, and the gland-vesicles contain the secreting cells.

The blood-vessels are distributed in the interlobular connective tissue, and form a capillary network on the wall of the gland-duets, and on the wall of the gland vesicles.

The **Pharynx** is an irregularly dilated canal, which forms a common passage, connecting the mouth with the oesophagus, and the nose with the larynx, so as to be subservient to the processes both of deglutition and respiration. Its position and connections have been described under the heading **ANATOMY.**

The wall of the pharynx consists of three coats—an external muscular and an internal mucous coat, and an intermediate fibrous membrane, which blends with the sub-mucous coat. The **muscular coat** consists of three pairs of circularly arranged muscles, the constrictors of the pharynx; and of two pairs of longitudinally arranged muscles, the stylo-pharyngeal and palato-pharyngeal, with occasionally a third pair, the salpingo-pharyngeal. The constrictor muscles extend from the lateral wall to the middle line of the posterior wall of the pharynx, and are named from below upwards the inferior, middle, and superior constrictors; they lie on three different planes, so that the inferior constrictor overlaps the middle, and the middle the superior.

The **mucous coat** of the pharynx lines the canal, and is
continuous through the several openings with the mucus membrane lining the Eustachian tubes, nose, mouth, larynx, and esophagus.

The epithelium covering the mucus membrane of the nasal part of the pharynx is columnar and ciliated over a considerable surface, but elsewhere the pharyngeal epithelium is tesselated and stratified; and in the latter localities, vascular papillae project into the epithelial layers. Small racemose glands lie beneath the mucus membrane, which is pierced by their ducts to open on the surface (fig. 2), they are most numerous in the nasal part of the pharynx. Collections of lymphoid tissue are found in the sub-epithelial connective tissue, more especially in the nasal part of the pharynx, where it forms a mass, extending across the posterior and upper wall, between the openings of the two Eustachian tubes, which Laschkis has called the *pharyngeal tonsil*. The arteries of the pharynx are derived from the internal carotid or some of its branches. The motor, sensory, and sympathetic nerves unite to form the pharyngeal plexus situated behind the middle constrictor muscle.

**Soft palate.** The *Soft Palate* forms an inclined plane, which projects, downwards and backwards into the pharynx, from the posterior border of the hard palate. It is less dependent at the sides than in the mesial plane, where it forms an elongated body, the uvula. Its anterior or oral surface is smooth, and gives origin on each side to a fold, which curves downwards to the side of the root of the tongue, to form the anterior palatine of the palate or fauces. Its posterior or pharyngeal surface, also smooth, gives origin on each side to a fold, which, springing from the base of the uvula, curves downwards and backwards to be lost in the side walls of the pharynx; this pair of folds forms the posterior palatine of the palate or fauces. The soft palate is complex in structure, and consists of muscles, mucous membrane, glands, blood and lymph vessels, and nerves. The muscles of the soft palate are arranged in two groups, those which elevate and make it tense, and those which contract the fauces.

The mucus membrane of the soft palate is continuous with that of the mouth and pharynx. The epithelium covering the anterior or oral surface is a stratified pavement epithelium. That on the posterior or pharyngeal surface is in infancy a laminated cylindrical and ciliated epithelium, with isolated areas of pavement epithelium, but in adults it is a laminated pavement epithelium. Numerous racemose mucous glands lie beneath the mucus membrane, but much more abundantly on the oral than on the pharyngeal aspect. Collections of lymphoid tissue, similar to those found in the tonsils, are also met with. The arteries are branches of the internal maxillary, facial, and ascending pharyngeal. The veins of the soft palate often assume a dilated character, and are continuous with the pharyngeal veins. Lymphatics are also distributed beneath the mucous membrane.

**Esophagus.** The *Esophagus* or *Gullet*, is an almost cylindrical tube, about 9 or 10 inches long, which transmits the food from the pharynx to the stomach. It commences in the neck opposite the body of the sixth cervical vertebra, where it is continuous with the pharynx. It passes down the lower part of the neck, traverses the cavity of the thorax, pierces the diaphragm at the esophageal opening, enters the abdomen, and becomes continuous with the cardiac end of the stomach close to that opening.

**Structure.** The wall of the esophagus consists of three coats, named, from without inwards, muscular, submucous, and mucous coats.

The *muscular or external coat* is divided into two layers, an external and an internal. The *external layer* is composed of fibres arranged longitudinally in the wall. The *internal layer* consists of fibres arranged in a series of rings around the tube, which lie sometimes horizontally, at others obliquely. The muscular coat in the upper fourth of the esophagus is red, and its fibres are transversely striped; in the second fourth non-striped fibres are mingled with the striped, whilst in the lower half the coat consists exclusively of non-striped fibres. By the contraction of the fibres of the muscular coat the food is propelled downwards into the stomach.

The *submucous coat* connects the muscular and mucous coats with each other. It consists of bundles of white fibrous tissue intermingled with elastic fibres, and the nerves and blood-vessels passing to the mucous coat ramify in it.

The *mucous or internal coat* lines the interior of the tube, and is continuous above with the mucous lining of the pharynx, and below with that of the stomach. When the esophagus is empty it is thrown into longitudinal folds; its free surface is covered by a thick layer of stratified squamous epithelium, which terminates abruptly at the cardiac orifice of the stomach in an irregular line. Projecting into the epithelium are multitudes of minute conical papillae. Opening on the surface of the membrane are the ducts of numerous small racemose glands similar to those in the pharynx. (fig. 2) Collections of lymphoid tissue, forming solitary follicles, are also found in the mucous membrane. The deep surface of the mucous membrane consists of a layer of non-striped muscular tissue, the bundles of which run longitudinally; it forms the muscular layer of the mucous coat, or *mucosum muscorum*.

The esophagus is supplied with blood by the inferior thyroid artery, the esophageal branches of the thoracic aorta, and the ascending branch of the coronary artery of the stomach. The nerves are derived from the esophageal, gastric, and sub-gastric, which form plexuses containing nerve-cells, not only in the muscular coat, but in the muscularis mucosae. A network of lymphatic vessels also occurs in both the mucous and submucous coats. **Abdominal cavity and peritoneum.** As the remaining portions of the alimentary canal are situated in the abdominal cavity, it will be advisable, before describing their anatomy, to give an account of the form and boundaries of that cavity, of its division into regions, and of the general arrangement of the peritoneum, which constitutes its lining membrane.

The *Abdominal Cavity, Abdomen, or Belly*, is the largest of the three great cavities of the body. It occupies about the lower two-thirds of the trunk, and extends from the diaphragm above to the pelvic floor below. As its walls, except in the pelvic region, are mostly formed of muscles and of fibrous membrane, they are much more distensible than those of the thorax, and permit considerable modifications to occur in the size of the viscera contained within the cavity. The abdomen is elongated in form; its vertical diameter is greater than either the transverse or the antero-posterior diameter. The superior boundary is formed by the concave vault of the diaphragm, and by the seven lower pairs of ribs and costal cartilages; in this boundary occur the openings through which the oesophagus passes into the abdomen, and also the aperture for the transverse of the great blood-vessels, the nerves, and the thoracic duct. The inferior boundary is formed by the levatores ani and coccygeus muscles, and the pelvic fascia, in reality the termination of the rectum and anal orifice, the termination...
of the urethra, and in the female that of the vagina also. The anterior boundary is formed above by the muscles of the anterior abdominal wall and the fascia transversalis; the lines also occupy its middle line, and about the middle of the line, the linea alba is the only membrane which serves to separate the anterior wall below is formed by the two pubic bones with the symphysis. The lateral walls, or flanks, are formed above by the flat muscles of the abdominal wall and the fascia transversalis, and below on each side by the rim and ischium with the muscles attached to them. The posterior wall is formed by the lumbar spine, sacrum, and coccyx, and by the muscles attached to them. The abdomen is primarily divided into the pelvis and abdomen proper. The pelvis is subdivided into the false pelvis, or the part above the pelvic brim, and true pelvis, or part below the pelvic brim.

**Peritoneum** is the largest and most complicated serous membrane in the body. Like the other serous membranes, it not only lines the walls of the cavity in which it is situated, but gives a more or less complete investment to the contained viscera. It is arranged, therefore, so as to form a peritoneal and a serous part, which are continuous with each other in the various regions where the peritoneum is reflected as a covering upon the viscera. A space or cavity, called the peritoneal cavity, is included between the parietal and visceral portion of the peritoneum which lies next the cavity is free, smooth, covered by an endothelium, and lubricated by a little serous fluid, which under some pathological conditions may be greatly increased in quantity, so as to cause abdominal dropsy. The peritoneum is divided into two layers by the mesentery, which is formed by a fold of peritoneum that extends from the greater curvature of the stomach to the lips of the transverse fissure of the liver; the gastro-enteric mesentery, or the mesentery of the small intestines, is the other layer, and is divided into stronger bundles, and at the pylorus they become more closely aggregated, so as to form the pyloric valve. At its pyloric end the stomach presents a small bulging, the lesser cul-de-sac, or antrum pylori.

The stomach is retained in position, partly by its connections with the oesophagus and duodenum, partly by the peritoneum, and forms the greater, lesser, and transverse abdominal walls and viscera, and partly by folds of peritoneum which pass from it to the adjacent structures. These folds are as follows:—The gastro-pyloric ligament extends from the diaphragm to the stomach in the angle between the oesophagus and the cardiac extremity; the gastro-hepatic or small omentum passes from the lesser curvature of the stomach to the lips of the transverse fissure of the liver; the gastro-splenic omentum from the cardiac end of the stomach to the spleen; the gastro-coelic or great omentum descends from the greater curvature of the stomach in front of the coils of the small intestines, and then ascends to inclose the transverse colon.

**Structure of the Stomach.**—The wall of the stomach consists of four coats, named, from within towards, serous, muscular, submucous, and mucous coats. The *external or serous coat* is that part of the peritoneal membranes which inclose the stomach,—one layer covering the anterior, the other the posterior surface. It leaves the stomach at the curvatures, where it forms the great and small omenta, and along these borders the two layers inclose between them the blood-vessels and nerves which supply the organ.

The *muscular coat* consists of non-striped fibres arranged in three layers from without inwards. The outer layer consists of longitudinal fasciculi, which are continuous with the external longitudinal layer of the oesophagus. They form scattered fasciculi extending longitudinally over the surface of the stomach from cardia to pylorus, but along the two curvatures, more especially the lesser, they are collected into stronger bundles, and at the pylorus they become continuous with the longitudinal fibres of the duodenum. The middle layer consists of circular fasciculi, which form a ring-like arrangement transversely to the long axis of the stomach. These fasciculi are comparatively thin and scattered at the cardiac end, but as they approach the pylorus they become more closely aggregated, so as to form a thick layer, which at the pylorus extends into the pyloric valve, and forms the *pyloric pylorius* muscle. The circular fibres of the stomach are in the same morphological plane as the circular fibres of the oesophagus and duodenum. The inner layer consists of oblique fasciculi, which are not found over the entire organ; the greater number spring from the left side of the cardia orifice, and radiate on the anterior and posterior surfaces towards the pylorus and greater curvature. These oblique fibres by their contraction approximate the cardia to the pylorus, the great curvature to the smaller, and the anterior to the posterior wall; they are thus the true grinding muscles of the stomach, and have been compared to the muscular gizzard of the bird. From oblique relations to the transverse colon, the cardia orifice they probably close that opening during gastric digestion. The longitudinal and circular fibres
occasion a longitudinal shortening and transverse constric-
tion of the stomach. By the action of the muscular coat
of the stomach, as described above, so as to become
thoroughly intermingled with the gastric juice. The con-
traction of the sphincter pylori closes the pyloric orifice,
and prevents the passage of the food into the duodenum,
before it is converted into chyme.

The mucous coat consists of the serosal variety of
connective tissue, and lies immediately subjacent to the
b模糊 layer of the muscular coat.

The mucous or internal coat lines the cavity of the
stomach, and is continuous with the mucous membrane
of the oesophagus and duodenum. It is a soft, pulpy
membrane, of a pink colour, which becomes redder during
digestion, owing to turgescence of the blood-vessels. At
the pyloric end it is often stained yellow or green with bile,
and in old people it has a brown colour, from formation of
pigment. In the empty stomach it is thrown into folds or
rugae, which have usually a longitudinal direction, but
when distended the rugae are obliterated; and the surface
of the mucous membrane is smooth. This membrane is
commonly said to be thicker at the pyloric end than in the
fundus; but Brunt, who had opportunities of examining
the stomach of healthy young adults immediately after
death, found the cardiac mucous membrane to be more
than twice as thick as the pyloric. He ascribes the thinnest
of the cardiac mucous membrane to the effects of post-
mortal digestion, owing to the gravitation of the gastric
juice, in the recumbent position of the dead body, into the
fundus of the stomach.

If the free surface of the gastric mucous membrane be
examined with a pocket lens it will seem to be pitted
with shallow depressions or alveoli, polygonal in form, and
varying from \( \sqrt[3]{2} \) th to \( \frac{1}{2} \) th inch in diameter. In the
interstices of each of these pits numerous rounded
orifices may be seen, which are the mouths of the gastric
secreting glands. If vertical sections be now made through
the mucous membrane, these glands will be seen to be
tubular in form.

In the human stomach the tubular glands are, for the
most part, simple, almost straight cylinders, and possess
an average length of \( \frac{1}{2} \) th inch, and a breadth of about \( \frac{1}{2} \) th
inch. They are somewhat dilated at their orifices, and at
their closed ends give rise to coxal pouches. For about
the upper fourth or fifth of their length the tubes are lined
by a single layer of columnar epithelium, continuous with
the columnar epithelium covering the free surfaces of the
gastric mucous membrane. In the rest of the gland-tube
Brunton found two kinds of cells. The one, the so-called
peptic cells, about \( \frac{1}{2} \) th inch in diameter, and of an ovoid
or somewhat polygonal form, lay next to the wall of the
gland. The other kind, somewhat cubical in form, lined the
very narrow central canal of the gland, and formed an
tubular axialis layer, which was continuous above with the
columnar epithelium lining the upper end of the tube.

It is in the dog and cat, however, that the structure of
the gastric mucous membrane has especially been studied,
and two kinds of glands have been described. The one,
situated especially in the region of the pylorus, consists for
the most part of simple tubes, which may, however, branch
at their deeper end; they have been called the mucous
glands. They are lined by a columnar epithelium, the cells
of which at the deeper end of the gland are more cubical in
form, and have a clouded granular appearance. The other
kind of gland is situated in the remaining part of the
gastric mucous membrane, and consists of tubes which
divide usually into four branches; they have been named
the peptic glands. The cellular lining of these peptic glands
consists of an epithelium which is continuous with the
dimorphous arrangement of the human stomach already referred to. Heidenhain
states that in a fasting dog the glands are shrunken, and
the axial cells are transparent, whilst during digestion the
peptic glands are swollen out and the cells are clouded and granular.

The gastric glands are separated from each other by slender pro-
longations of the muscular mucosae, and by the vascular inter-
glandular connective tissue, which is soft and delicate, and contains
a small proportion of lymphoid corpuscles diffused in it. In some
localities the lymphoid tissue may be collected into solitary follicles,
forming the rectangular glands of the stomach. Beneath the glands
is a well-defined muscularis mucosae, arranged in two layers,
which gives off bundles that pass between the gastric glands.

The gastric mucous membrane is highly vascular; small arteries
enter it from the submucous coat, and terminate in a capil-
ary plexus, situated in the inter-
glandular connective tissue sur-
rounding the gastric glands, a
vascular capillary ring surrounds the orifice of each gland.

The pyloric valve is the name given to the circular fold,
situated at the junction of the stomach and duodenum,
which surrounds the pyloric orifice. This fold is covered
on its free surface by mucous membrane, which incloses the
submucous coat and the circular layer of the muscular coat,
but not the longitudinal layer, or the serous coat. That
portion of the mucous membrane which covers the gastric
surface of the valve possesses the structure of the mucous
membrane of the stomach; whilst that which covers the
duodenal surface is studded with villi, and possesses the
structure of the intestinal mucous membrane.

The arteries of the stomach form arches along the greater
and lesser curvatures, and anastomose in the anterior and
posterior walls of the stomach. The veins of the stomach
are rootlets of the portal vein. The lymphatics are numer-
ous, and form a superficial and a deep set. The nerves
of the stomach are derived from the epigastric plexus of the
lymphatic and from the pneumogastric nerves.

The Intestinal Canal. Intestine, Gut, or Bowel, is situated
in the abdominal cavity, and extends from the pyloric
opening, or gate, of the stomach to the orifice of the anus.
In it the chyme becomes mingled with the bile, the pan-
creatic fluid, and the secretions of the intestinal glands,
and is converted into chyle. In it also the absorption of
the chyle takes place, and the insoluble part of the food
is passed onwards to be excreted in the form of feces.
The intestine is the longest division of the alimentary canal,
and measures on an average about 25 feet. It is primarily
divided into two parts, called small intestine and large
intestine; the length of the small is about 29 feet, that of
the large about 5 feet.

The Small Intestine is the upper of the two divisions of
the canal, and consists of a convoluted, almost cylindrical
tube, which reaches from the pylorus to the cecum,
or commencement of the large intestine. It is subdivided into
three portions, named duodenum, jejunum, and ileum.

The Duodenum is the commencement of the small
intestine, and has received its name from its length being
regarded as about equal to the breadth of twelve fingers.
It forms the shortest and widest of the three subdivisions
of the small bowel; it curves, in the form of a horse-shoe,
from the pylorus to opposite the left side of the body of

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the second lumbar vertebra, where it becomes continuous with the jejunum. The duodenum is distinguished from the rest of the small intestine by having the ducts of the liver and pancreas opening into its canal, by containing in its wall a collection of compound racemose glands, named the glands of Brunner, and by being developed from the primitive fore-gut, and not, like the jejunum and ileum, from the primitive middle gut. Like the stomach, it should be regarded as a distinct segment of the alimentary canal.

The Jejunum and Ileum form by far the longest part of the small intestine, and are not separated from each other by any sharp line of demarcation—the upper two-fifths being called jejunum, on account of its being usually empty after death, the lower three-fifths being termed ileum, from its convoluted arrangement. They occupy the umbilical, hypogastric, right and left iliac regions of the abdomen, in which they are arranged in a series of coils or convolutions; one or two coils of the ileum sometimes lie in the cavity of the pelvis between the bladder and rectum. The coils are attached to the posterior wall of the abdomen, along a line from the body of the first lumbar vertebra to the right macro-iliac joint, by the fold of peritoneum called the mesentery. Owing to the extent of the mesentery, the coils of the jejunum and ileum can be freely moved about in the abdominal cavity, so that they are apt to be displaced from their natural position, and, when a rupture occurs, to become the most usual contents of the hernal sac. The lower end of the ileum passes into the right iliac fossa, where it becomes continuous with the large intestine, at the junction of the caecum and ascending colon. Though the line of demarcation between jejunum and ileum as an arbitrary one, yet the upper end of the jejunum may be distinguished from the lower end of the ileum by being parallel to the long axis of the intestine. The inner layer consists of the greater part of its extent of four coats, named, from without inwards, serous, muscular, submucous, and mucous coats.

The serous or external coat, derived from the peritoneum, forms a complete investment for the jejunum and ileum, and is continuous with the peritoneum along a line of attachment, named the mesenteric border of each coat; but the serous covering of the duodenum is incomplete.

The muscular coat consists of non-striped fibres arranged in layers from without inwards. The outer layer consists of longitudinal fasciculi, which form a thin layer parallel to the long axis of the intestine. The inner layer consists of circular fasciculi arranged around the gut transverse to its long axis; this layer is thicker, stronger, and more highly coloured than the longitudinal layer. By the contraction of the muscular coat, the peristaltic or vermiform movement is produced, which propels the ingested materials along the intestine.

The submucous coat lies immediately subjacent to the circular layer of the muscular coat, and consists of areolar connective tissue, in it the blood-vessels ramify before they pass into the mucous membrane.

The mucous or internal coat is a soft, velvety-looking membrane, which lines the wall of the small intestine, and possesses a complex appearance and structure. The inner surface is not smooth, but is thrown into strongly-marked, transverse folds, the valvulae conucentes, which are not obliterated during distension of the gut. They are very numerous in the duodenum and jejunum, but then decrease in size and numbers, until at the lower end of the ileum they have disappeared. Each valvula consists of fold of the mucous membrane with its submucous coat. Owing to their presence, the extent of the mucous surface is much greater than if it were a plane-surfaced membrane.

In its more minute structure the mucous coat may be regarded as composed of numerous projecting bodies, a glandular layer, and a muscular layer.

The projecting bodies are the intestinal villi, which just out into the lumen of the intestine from the free surface of the mucous membrane, not only of the valvula, but of the intermediate surface. They are delicate, minute processes, varying in length from a fourth to half a line, and in number amount to several millions.

They are best examined when the mucous surface is placed in water or spirit, when they may be seen with the naked eye, or, still better, with a pocket lens; when the chyle-vessels or blood-vessels are injected, they become erected, and stand out more prominently from the surface. They vary in form, being filiform, or cylindrical, or conical, or club-shaped, or leaf-shaped. They are more numerous in the duodenum and jejunum than in the ileum, and to their presence is due the velvety appearance of the mucous surface. They are not found elsewhere than in the small intestine.

As they are the parts of the mucous membrane directly concerned in the absorption of the chyle, their structure is interesting and important. Each villus is invested by a cap of epidermis continuous with the general epithelial covering of the mucous membrane. The epithelium consists of a single layer of columnar cells, compactly arranged side by side. Scattered amidst the columnar cells are cells which possess the form of microscopic goblets, and are named goblet cells. The free end of each goblet cell appears to have an open mouth on the surface of the villus, through which a mucus-like substance exudes. Various opinions have been expressed as to the nature of these goblet cells. Some regard them as special structures engender either in the absorption of chyle, or the secretion of mucus; others look upon them as merely modifications of the columnar epithelium; whilst others again consider them to be post-mortem productions, due to the swelling out of the columnar epithelium by the imbibition of fluid. There can be no doubt, however, that they are not specially concerned in the absorption of chyle, as cells of the same character are found in the respiratory mucous membrane, and on other surfaces, where the absorption of chyle does not take place.

The sub-epithelial tissue of a villus forms its matrix or basis substance, and consists of the sub-epithelial connective tissue of the mucous membrane. When thin sections through a villus are examined, the matrix is seen to be

Diagram
which ends near the apex of the villus, as a dilated microcapillary cul-de-sac. By its opposite extremity it becomes continuous with a plexus of lacteals in the submucous coat. In the matrix substance, around the lacteal vessel of the villus, is a layer of non-striped muscular fibro-cells, which is continuous with the general muscular layer of the mucous coat, and extends as far as the apex of the villus. By the contraction of this layer the chyle during absorption is propelled along the lacteal vessel. The villus also contains blood-vessels; a small artery enters at its attached base, and terminates in a capillary plexus, situated in the peripheral part of the matrix, close to the cap of epithelium; from the plexus a vein arises, which leaves the villus at its base, and joins the veins in the submucous coat.

Various theories have been put forward to account for the mode of passage of the chyle, during digestion, from the lumen of the intestine into the lacteal vessels of the villi; but the question cannot even yet be regarded as definitely settled. The appearance of a network of minute tubules within the matrix, extending from the epithelial investment to the lacteal, which Letzener supposed to be the channels along which the chyle flowed, is doubled on the arrangement of the strands of the retiform tissue. There seems little doubt that both the cells of the epithelial investment and those of the retiform tissue of the matrix become distended with the particles of chyle previous to its passage into the lacteal. The view advanced by Schafer, that the corpuscles in the meshes of the retiform tissue may serve as carriers of the fatty particles of the chyle into the lacteals, is another mode of expressing the function of these cells advocated thirty years ago by Goodel.

The mucous membrane of the small intestine is abundantly provided with secreting glands, named the glands of Brunner and of Lieberkuhn.

Brunner's glands are confined to the duodenum; they belong to the compound racemose group of glands, and resemble generally in structure the mucous and salivary glands. The minute lobules of these glands lie in the submucous coat, and the excretory duct pierces the mucous membrane to open on the surface. The wall of the duct is formed of connective tissue lined by columnar epithelium. The finest branches of the duct are continuous with the acini or gland vessels, and the gland-vessels contain the secreting cells, which are columnar in form. A plexus of capillary blood-vessels is distributed outside the membrana propria of the gland-vessels, and lymphatic vessels lie around the lobules. Into the duodenum, about the junction of its descending and horizontal portions, the duct of the pancreas, and the bile duct from the liver, open by a common orifice. These glands may be regarded, therefore, as accessory glands to this portion of the small intestine.

The glands of Lieberkuhn are distributed throughout the whole length of the mucous coat of the small intestine. They are simple tubular glands, in shape like test tubes, which he vertically in the mucous membrane, and form its proper glandular layer (figs 5 and 6). The tubes are microscopic in size, vary in length from \(\frac{1}{3}\)th to \(\frac{1}{2}\)th of a line, and are sometimes closely set together, but in the localities where the solitary and Peyer's glands occur they are more widely separated. The glands open on the surface of the mucous membrane between the villi, and the opposite end of the tubes is closed and rounded, and reaches close to the muscular layer of the mucous coat. They are lined by a layer of columnar epithelium, cells, continuous with the epithelial investment of the villi. The glands are separated from each other by reteform connective tissue, in the meshes of which colourless lymphoid corpuscles exist in considerable numbers, the plexus of capillary blood-vessels, which is distributed outside the membrana propria of the gland tube, lies in this connective tissue.

The connective tissue of the mucous coat is characterized generally by its retiform character, and by the diffusion of colourless lymphoid corpuscles in the meshwork. But in some parts of the mucosa these corpuscles, with their supporting framework of retiform tissue, are collected into distinct masses or follicles, visible to the naked eye, and known as the solitary and Peyer's glands or follicles.

The solitary glands are scattered throughout the whole length of the intestinal mucous membrane. They are about the size of millet seeds, and vary in number and distinctness in different individuals. They are globular or ovoidal in form, and occasion a slight elevation of the mucous membrane. One pole of the gland lies next the free surface of the mucous membrane, and is in relation to the columnar epithelium covering the mucosa, whilst the opposite pole rests on the submucous coat. Peyer's glands, or the aggregated glands, consist of an aggregation of solitary glands or follicles, which are crowded together, as to form distinct elongated patches, which may vary in length from \(\frac{1}{2}\) inch to 3 or 4 inches. The long axis of each patch corresponds to the long axis of the intestine, and the patches are placed opposite to the mesenteric attachment of the bowel. Yli either may or may not be situated on the surface of the patch, in the intervals between the individual follicles; but Lieberkuhn glands are always found opening on the surface, and frequently forming a ring of orifices around each follicle. Peyer's patches are most abundant in the lower end of the...
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ileum, but diminish in size and numbers in its upper end and in the jejunum, and are absent in the duodenum.

The follicles are lymphoid organs, and are composed of lymphoid and adenoid tissue. The solitary and Peyer’s glands, as is the case generally with the lymphoid organs, are more distinct and perfect in structure in infancy and childhood, than in adults or in advanced age.

The muscular layer of the mucous membrane lies next to the submucous boat, and consists of non-striped fibres, which lie parallel to the surface of the membrane. It passes into the substance of the villi, and lies around the closed end of the glands of Lieberkühn.

Of the blood-vessels of the small intestine, the arteries enter the wall of the jejunum and ileum at its attached or mesenteric border, and are branches from the arcades of the superior mesenteric artery. They run in the sub-serous tissue around the wall of the intestine; then pierce the muscular coat and supply it; they then enter the submucous coat, and form a network from which branches pass into the mucous coat. It is on these arteries, and form rootlets of the superior mesenteric vein.

The lymph-vessels, or lacteals, may be traced into the wall of the intestine at the mesenteric border; they form a network in the muscular coat, and then enter the submucous coat, where they are very abundant; from this submucous layer offshoots pass through the rectiform tissue, which lies between the Lieberkühnian glands, into the villi. Where the solitary and Peyer’s glands are situated, the lacteals, as Frey has pointed out, form a system of anastomosing vessels around the base and mesial part of each follicle.

The nerves are derived from the plexuses of the sympathetic, which accompany the branches of the superior mesenteric artery. They form between the two layers of the muscular coat an important plexus, named, after its discoverer, Auerbach’s plexus, in which large stellate nerve-cells are intermingled with nerve-fibres, and a similar nervous plexus is found in the muscular coat of the other divisions of the alimentary canal. It supplies and regulates the movements of the muscular coat.

The Large Intestine, though not nearly so long as the small intestine, is of much greater diameter. It reaches from the end of the ileum to the orifice of the anus, and is divided into the caecum with the appendix vermiformis, the colon, the rectum; whilst the colon is subdivided into the ascending colon, the hepatic flexure, the transverse colon, the splenic flexure, the descending colon, and the sigmoid flexure.

The Caecum, the dilated commencement of the large intestine, lies below the ileum, and occupies the right iliac fossa. It forms a large cul-de-sac, closed in below, but communicating freely above with the ascending colon.

Opening on the inner and posterior wall of the caecum is the appendix vermiformis, which is a slender hollow prolongation of the bowel, varying in length from 3 to 6 inches. It has the calibre of the stem of a common tobacco pipe, and ends in a free closed extremity, so that, like the appendix, it is a cul-de-sac. It is present in mammals, but is present in man, the orang. certain lemurs, and the marsupial wombat.

The Colon extends from the caecum to the rectum, and forms the longest part of the large intestine. The transverse part of the colon lies immediately below the great curvature of the stomach, but owing to the length of the transverse meso-colon, which forms its peritoneal attachment, it is frequently undergoes some change in its position, and may hang downwards towards the pelvis, or be elevated in front of the stomach, or thrown to the right or left side.

The sigmoid flexure of the colon is situated in the left iliac fossa, but as the sigmoid meso-colon, which forms its peritoneal attachment, is of some length, it is freely movable, and not unfrequently hangs into the pelvis, or even extends across into the right iliac fossa.

The Rectum is the terminal segment of the large intestine, and extends from the sigmoid flexure to the orifice of the anus. It lies in the cavity of the pelvis. It commences opposite the left sacro-iliac joint, and passes at first obliquely downwards and to the right until it reaches the middle line of the sacrum; secondly, it closely follows the curvature of the sacrum and coccyx, lying in relation to their anterior surface; thirdly, when it reaches the tip of the coccyx its terminal or third part inclines downwards and backwards for about 1 1/2 inch to the anal orifice. The anus opens on the surface of the middle line of the perineum, midway between the two ischial tuberous, and the skin surrounding the orifice is thin, and wrinkled when the opening is closed. Immediately beneath the skin is the sphincter ani externus muscle, which forms a thin layer of fasciculi, arranged in a series of ellipses around the orifice. The sphincter in its normal condition of contraction simply closes the opening, but, under the influence of the will, a more powerful contraction can be induced, so as to resist the entrance of foreign bodies into the rectum.

The large intestine is arranged in the abdominal cavity in the form of an arch, the summit of which is the transverse colon, whilst the caecum and rectum are the right and left pairs. Within the concavity of this arch the coils of the jejunum and ileum are situated. The large intestine is not, except in the rectum, a cylindrical tube, but is dilated into three parallel and longitudinal rows of sacculi, which rows are divided from each other by longitudinal muscular bands, whilst the sacculi in each row are separated externally by intermediate constrictions. In the rectum the sacculi have disappeared, and the intestine assumes a cylindrical form, but at its lower end it dilates into a reservoir, in which the feces accumulate prior to being excreted.

At the junction of the large with the small intestine a valvular arrangement, termed the ileo-caecal or ileo-colic valve, is found. This valve is due to the peculiar manner in which the ileum opens into the large intestine.

The opening is bounded by two semi-lunar folds, which project into the large bowel. These folds are the two segments of the valve; one situated above the opening is the ileo-caecal segment, the other, below the opening, the ileo-caecal. The two segments become continuous with each other at the ends of the elongated opening, and are prolonged for some distance around the inner wall of the large intestine as two prominent ridges, named the frama of the valve. The use of the ileo-caecal valve is to impede or prevent the reflux of the contents of the large into the small intestine. When the caecum and colon are distended the frama of the valve are put on the stretch, and the two segments are approximated, so that the opening is reduced to a mere slit, or even closed, if there is great distension of the bowel.

Structure of the Large Intestine.—The wall of the large intestine consists in the greater part of its extent of four coats, named, from without inwards, serous, muscular, submucous, and mucous coats.

The serous or external coat, derived from the peritoneum, forms a complete investment for the flexures of the colon, the transverse colon, and the first part of the rectum, but not for the caecum, or the ascending and descending colon. The second part of the rectum has only a partial serous investment, and the third part has no serous coat. Numerous pedunculated processes invested by the serous membrane, and containing lobules of fat, named appendices epiploicae, are attached to the large intestine.

The muscular coat consists of non-striped fibres arranged...
in two layers from without inwards. The outer layer consists of longitudinal fasciculi, which are not as a rule distributed uniformly in the wall, but in the cecum and colon are collected into three longitudinal bands, which start from the cecum, where it is joined by the appendix vermiformis, and extend along the colon to the rectum. As these bands are not so long as the colon itself, they occasion the puckering which separate the sacculi, so that when the bands are cut through the sacculi disappear. The colon then becomes more elongated and cylindrical.

In the appendix vermiformis the longitudinal layer is not collected into bands, but arranged uniformly along the wall. In the rectum, also, the longitudinal layer is spread uniformly along the wall, and forms a well-defined red-coloured layer.

The inner layer of the muscular coat consists of circular fasciculi distributed around the wall of the large intestine. In the rectum this layer increases in thickness, and in proximity to the anus forms a circular muscle, the sphincter ani externus, which is a strong band, about half an inch broad, around the lower end of the rectum. In the large, as in the small intestine, the muscular coat occasions the peristaltic movements, and its increased thickness in the rectum is for the purpose of expelling the faeces.

The submucous coat has similar relations and structure to the corresponding coat in the small intestine.

The serous or external coat is not thrown into valvulose convolutions, but presents a series of well-marked permanent ridges, lying transversely or somewhat obliquely to the long axis of the gut, and corresponding internally to the structures, which, on the outer surface of the colon, separate the sacculi from each other. The mucous membrane of the large intestine is covered by a layer of columnar epithelium. It is devoid of villi, and consists of a glandular and a muscular layer. The secreting glands of the glandular layer have the form and structure of the Lieberkuhnian glands of the small intestine (fig 7); they open on the free surface of the mucous coat, and, owing to the absence of villi, their mouths are more closely set together than is the case with the corresponding glands in the small intestine; the tubular glands are separated by a retiform tissue with lymphoid corpuscles. Solitary glands, similar to those in the small intestine, are also present, but no Peyster's patches. The muscular mucosae resemble generally that of the small intestine.

Of the blood-vessels of the large intestine, the arteries are principally derived from branches of the superior and inferior mesenteric arteries, but the lower end of the rectum receives the hemorrhoidal branches of the internal iliac and the pudic. The veins which correspond to these arteries for the most part join the superior and inferior mesenteric veins, and are consequently rootlets of the portal. But the veins which belong to the middle and inferior haemorrhoidal arteries form a plexus about the anal orifice, which partly joins the superior haemorrhoidal vein, and through it the portal vein, and is partly connected through the middle and inferior haemorrhoidal veins with the internal iliac vein, and through it with the inferior vena cava. The veins about the anus are very apt to become varicose, and to form the excrescences termed haemorrhoids or piles. The lymph vessels are arranged as in the small intestine, except that they are not prolonged into vili. Nervous plexuses with ganglion cells are found in both the mucosal and submucous coats. They proceed from the superior and inferior mesenteric plexuses, but the rectum receives branches from the hypogastric plexus, and from the third and fourth sacral spinal nerves.

The liver is the biggest of the abdominal viscera, and the largest gland in the body. It is the organ in which the secretion of bile takes place, and is the chief seat in the body of the formation of glycogen, a substance like dextrin, which readily undergoes conversion into sugar. It lies in the costal zone of the abdomen, fills up the greater part of the right hypochondrium, and extends, through the epigastrium, into the left hypochondrium. In its long or transverse diameter it averages about 12 inches, in its antero-posterior diameter about 6 inches, in the vertical diameter of its thickest part about 3 inches. Relatively to the size of the body the liver is bigger and heavier in the fetus than in the adult, soon after birth the relative weight declines, and that of the kidney diminishes much more rapidly than the liver itself. Frenchel states that the relative weight of the healthy liver fluctuates in adults between 1/4th and 1/5th of that of the body, and the absolute weight varies from 1.8 to 4.6 pounds. During the digestion of the food the liver increases both in size and weight, partly from the greater quantity of blood flowing through it, and partly from the new material in the secreting cells, whilst after a long fast it becomes smaller and lighter.

For descriptive purposes the liver may be regarded as having two surfaces, a dorsal and a ventral, and two borders, a left and a right.

The superior or diaphragmatic border is smooth and convex, and attached to the diaphragm by the falciform ligament.

The posterior or vertebral border is comparatively thick, and attached by the coronary ligament to the diaphragm. The anterior border of the liver is unattached, thin, and attenuated, and is marked by a deep notch, opposite the anterior edge of the falciform ligament, which lodges the round ligament of the liver.

Of the two surfaces of the liver the right is thick and massive, and lies deep in the right hypochondrium, in contact with the diaphragm; the left is thin and attenuated, and overlaps the oesophageal opening and fundus of the stomach.

The inferior or visceral surface of the liver is much more complex in form than the upper. The hemispherical umbilical fissure, continuous with the notch in the anterior border of the liver, and much nearer to the left than the right extremity of the gland, divides it into a large right
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liver substance called *pons hepatis*. The under surface of the left lobe is smooth, and overlaps the anterior surface of the right lobe. The under surface of the right lobe is divided into smaller lobes by fissures and fossae. Starting from about the middle of the longitudinal fissure is the *portal or transverse fissure*, which extends for from 3 to 4 inches across the under surface of the right lobe. It is the gate (porta) of the liver, the point of entry of the portal vein, the hepatic artery, hepatic duct, and hepatic nerves and lymphatics. A short distance to the right of that part of the longitudinal fissure in which the round ligament lies, is the *fossa for the gall bladder*, which is a depression on the under surface of the right lobe extending from the anterior border to the transverse fissure: in it the gall bladder lies. Extending somewhat obliquely from the posterior border of the liver, towards the transverse fissure, is a deep fossa for the *inferior vena cava*. Opening into the vena cava as it lies in this fossa are the trunks of the large hepatic vena cavae from the substance of the liver. A portion of liver substance, which is bounded by the gall bladder, the longitudinal fissure, the transverse fissure, and the anterior border, forms a four-sided lobe called *lobus quadratus*. Another portion, bounded by the transverse fissure, the posterior border, the vena cava, and the longitudinal fissure, is the *lobus Spigelii*. A thin prolongation of liver substance continuous with the lobus Spigelii, and running obliquely between the fossa for the inferior vena cava and the transverse fissure, is the *lobus caudatus*.

Structure of the Liver.—The liver is a solid organ, of a brownish-red colour. It is composed of the ramifications of the portal vein, of the portal capillaries, the hepatic vein, the hepatic artery, the hepatic duct, of secreting cells, nerves, and lymphatics. These several structures are bound together by connective tissue, and the organ is invesited by the peritoneum. The liver possesses two coats, a serous and a fibrous.

The serous or *external coat* is a part of the peritoneal membrane, and forms an almost complete investment for the liver. It is reflected from the transverse fissure as the gastro-hepatic omentum, and from the upper surface and the posterior border as the falciform, coronary, and right and left lateral ligaments of the liver.

The fibrous coat, or *tunica propria*, is immediately subjacent to the serous coat. When carefully raised from the liver delicate processes of areolar tissue may be seen to pass from its deep surface into the substance of the organ. At the transverse fissure it is prolonged into the liver as a very distinct sheath, enveloping the portal vein, hepatic artery, hepatic duct, nerves, and lymphatics. This sheath is named the *capsule of Glisson*, and is prolonged throughout the substance of the organ, along the ramifications of the portal vein and the structures that accompany it.

*Lobules of the Liver.*—To the naked eye the substance of the liver does not present a homogeneous aspect, but is mottled, and mopped out into multitudes of small areas or lobules,—the *hepatic lobules or leaflets*. The lobules of the liver are irregular polygons, and vary in size from 1/8th to 3/8ths of an inch. In man and the mammalia generally the lobules are imperfectly separated from each other by the interlobular vessels and duct, and a scarcely appreciable quantity of areolar connective tissue. In the pig, camel, and polar bear, each lobule is circumscribed by a definite capsule of connective tissue.

As a lobule of the liver is a liver in miniature, and as the structure of the entire liver is the sum of the structure of its lobules, it will be necessary to examine with care the contents of a lobule, and the arrangement of the vessels, duct, and nerves which pass to and from it. An hepatic lobule is composed of blood-vessels, secreting cells, and bile ducts, with perhaps nerves and lymphatics. The blood vessels will first be considered.

The *portal vein* conveys to the liver the venous blood from the stomach, spleen, pancreas, gall bladder, and small and large intestine. It ascends to the transverse fissure, and before it enters the liver divides into two branches, one for the right and one for the left lobe. In its course within the liver, the portal vein divides and subdivides after the manner of an artery. It is closely accompanied by the hepatic artery and duct, and, along with them, is invested by the fibrous sheaths, called *Glisson's capsule*. The terminal branches of the portal vein run between the lobules, and are named, from their position, the *interlobular branches*. The interlobular branches lie around the circumference of a lobule, and anastomose with each other. They partly terminate directly in a capillary network situated within the lobule, and partly give off fine branches, which enter the lobule before they end in the capillary network. The *intralobular capillaries* form a close network, and converge from the periphery of the lobule, where they spring from the interlobular branches of the portal vein, to the centre of the lobule, where they terminate in the *intralobular or central veins*, one of the rootlets of the hepatic vein.

In man, where the lobules are not separated from each other by a definite capsule, the capillaries of one lobule to some extent communicate with those of adjacent lobules.

The *hepatic artery* closely accompanies the portal vein, and divides into two branches, for the right and left lobes. In man, where the lobules are not separ­ated from each other by a definite capsule, the capillaries of one lobule to some extent communicate with those of adjacent lobules.

The *hepatic veins* arise within the substance of the liver from the intralobular capillaries. In the centre of each lobule is the *intralobular or central vein*. It traverses the axis of the lobule, and leaves it to join a small vein running immediately under the bases of adjacent lobules, which, from its position, is named the *sublobular vein*. Adjacent sublobular veins then join together, and form larger vessels, which are the trunks of the hepatic vein, or...
the hepatic venous canals. These trunks run towards the posterior border of the liver, and open into the inferior vena cava.

From this description of the vascular arrangements within the liver, it will be seen that the intralobular capillaries are continuous with three vascular trunks;—two which carry blood to them, the portal vein and the hepatic artery, and one which conveys the blood away from them, the hepatic vein. The communication in each case is so free that the capillaries can be artificially injected from any one of these vessels.

The secreting cells of the liver, hepatic cells, form the proper parenchyma of the organ. They are situated within the lobules, and occupy the spaces of the capillary network. The cells vary in diameter from \( \frac{1}{120} \) th to \( \frac{1}{480} \) th inch, they have the form of regular polyhedrons, with from four to seven sides, and with the angles sometimes sharp, at other times rounded. They do not appear to possess definite walls, but have a distinct nucleus. The cell protoplasm is granular, and usually contains fat drops, and yellow particles, apparently bile pigments. The general arrangement of the cells is in rows or columns, and when sections are made through a lobule, transverse to the long axis of the central vein, the columns of cells are seen to converge from the periphery to the centre of the lobule, and to form a network.

By many observers the cells are regarded as in contact with the intralobular capillaries, without the intervention of an intermediate membrane. By others, and more especially by Lionel Beale, the secreting cells are regarded as inclosed in a tubular network, the wall of which is formed by a basement membrane. Beale states that the diameter of the network is usually about \( \frac{1}{480} \) th of an inch in most mammals. According to this view, the cells are not in direct contact with the capillary blood-vessels, but separated from them by the basement membrane. In some parts of the lobule Beale has been able to demonstrate the basement membrane as distinct from the wall of the capillaries, but usually they are incorporated together. At the periphery of the lobule the membrane becomes continuous with the wall of the interlobular duct.

The bile duct of the liver is the tube that conveys the bile out of the liver. It leaves the transverse fissure as two branches, one from the right, another from the left lobe, which almost immediately unite at an acute angle. It closely accompanies within the liver the ramifications of the portal vein and hepatic artery, and its terminal branches pass between the lobules to form the interlobular branches of the duct. If the hepatic duct be injected, not only does the injection fill the interlobular ducts, but it flows into a set of excessively minute passages within the lobules themselves. These passages are arranged so as to form a polygonal network, which may appropriately be called the intralobular biliary network. This network has a most intimate relation to the polyhedral hepatic cells, for the passages lie between the flattened sides of adjacent cells, so that each cell is inclosed in a mesh of the network. The German observers, who first directed attention to these passages, named them bile-capillaries, but it is probable that they are merely intercellular passages bounded by the protoplasm of the hepatic cells.

The intralobular biliary network differs from the intralobular blood capillary network, not only in the character of the fluid conveyed, but in other important particulars. The bile passages have a transverse diameter of about \( \frac{1}{480} \) th of that of the blood capillaries, the passages are in relation to the sides of the cells, the blood capillaries to their angles, so that the two systems of networks are not in contact with each other, but are separated by intervening hepatic cell substance; the passages have not, in all probability, an independent wall, such as is possessed by the blood capillaries. As these passages can be injected from the hepatic duct, and as they convey bile from the interior of the lobules into the duct, it is obvious that they must be continuous with the lumen of the interlobular branches of the duct, at the periphery of the lobules.

The wall of the larger bile ducts is formed of a fibro-elastic tissue, with a proportion of non-striped muscular fibre; it is lined by a columnar epithelium. Opening into the larger ducts are numerous orifices, which communicate with branched cecal tubes and follicles, situated within and clustered around the walls of the larger ducts, often in considerable numbers. Some of these appendages to the duct double-walled serve as glands for the secretion of mucus, but others are probably, as Beale supposed, direct continuations of the duct, in which the bile may be temporarily retained, as in the gall bladder.

The lymphatics of the liver form a superficial and a deep set. The superficial set ramifications beneath the serous coat, where they form a network. The deep lymphatics accompany the portal vein and hepatic artery as far as the intervals between the lobules, where they form interlobular lymphatics, which, like the corresponding branches of the portal vein, run around the lobule.

The nerves of the liver arise from the coeliac plexus of the sympathetic and from the left pneumogastric. They accompany the portal vessels in their distribution, and supply the muscular coats of the vessels.

The Gall Bladder is a reservoir for the bile, situated in a fossa on the under surface of the right lobe of the liver, and in a notch in its anterior border (fig. 8). It is pyriform in shape; its larger end, or fundus, projects slightly by a muscular cord, or fundus, projects beyond the anterior border, its opposite end, or neck, gives origin to the cystic duct, which is directed towards the transverse fissure, after a course of \( \frac{1}{4} \) inch it joins the hepatic duct, and forms the common bile duct, ductus communis choledochus. At its neck, the gall bladder bends on itself in a sigmoid curve. The gall bladder is 3 or 4 inches long, and can hold from one to two ounces of bile. It is attached to the liver partly by areolar tissue, and partly by the peritoneum, which is reflected over its free surface.

Structure.—In addition to its partial serous coat, the gall bladder has a fibrous and mucous coat. The fibrous coat consists of interlacing bands of connective tissue, with which non-striped muscular fibres are sparingly intermingled. The mucous membrane lining the gall bladder is deeply bile-stained, and presents on its free surface an alveolar appearance, due to the presence of multitudes of minute folds, which form a reticulum with intermediate depressions. The surface is covered by columnar epithelium. The mucous lining of both the neck of the gall bladder and cystic duct is thrown into folds, which in the duct have an oblique direction, and form the spiral valve. Racemose glands, for the secretion of mucus, occur in the wall of the gall bladder, cystic duct, and common bile duct. The gall bladder is supplied with blood by the gastroduodenal artery. It receives lymphatics and nerves continuous with those which belong to the liver.

The common bile duct, formed by the junction of the cystic and hepatic ducts, is about 3 inches long, and conveys the bile into the duodenum. It lies in the gastro-
hemp”. If the pancreas is not relieved of its metabolic load, it can become inflamed, leading to pancreatitis. This inflammation can cause severe pain and affect the function of the pancreas, leading to complications like diabetes.

The pancreas is a vital organ that plays a crucial role in the digestive system. Its correct functioning is essential for maintaining overall health and well-being.
incisors round and fusiform, in the lower laterally compressed, and sometimes marked by a longitudinal groove. Although the human incisors are, as the name implies, cutting, chisel-shaped teeth, in many mammals the incisors are greatly modified in form, as for example in the tusks of the elephant. The determination of the incisor teeth does not depend, therefore, on their form, but on their position in the jaws. The name incisor is given to all the teeth situated in the pre-maxillary portion of the upper jaw, and in the anterior end of the lower jaw, whatever their shape may be.

The canine or unicuspid teeth, four in number, one on each side of the mesial plane of each jaw, are placed next the lateral incisors. They are bigger than the incisor teeth, and the upper canines, which are sometimes called the eye-teeth, are larger than the lower; the fangs of the upper canines are lodged in deep sockets in the superior maxillary, which extend towards the floor of each orbit. The crowns of these teeth are thick and conical; the fangs are long, single, conical, compressed on the sides where they are marked by a shallow groove. In many mammals these teeth are developed into large protruding tusks.

The premolar or bicuspid teeth, eight in number, two on each side of the mesial plane of each jaw, lie immediately behind the canines, and the upper bicusps are somewhat larger than the lower. The crown is quadrilateral in form, and convex both on the inner and outer surfaces. It possesses two cusps, of which the outer or labial is larger and more projecting than the inner, palatal, or lingual cusp. The fangs of the upper bicusps are single and laterally compressed, often bident at the point into an outer and inner segment; in the lower bicusps the fangs are rounded, and taper to a single point.

The molar or multicuspid teeth, twelve in number, are placed three on each side of the mesial plane of each jaw. They are the most posterior teeth, are the largest of the series, and as a rule decrease in size from the first to the last; the crowns of the lower molars are somewhat bigger than those of the upper molars. The last molar tooth does not erupt until the end of puberty, and is called dena septium, or wisdom tooth. The crowns are broad, quadrilateral, and convex both on the inner and outer surfaces. The first and second upper molars have four cusps projecting from the angles of the grinding or masticating surface, and an oblique ridge often connects the large anterior internal cusp with the posterior external cusp; in the upper wisdom tooth, the two inner or palatal cusps are frequently conjointed. The first molar has five cusps wherein two cusp is interposed between the two posterior cusps; in the second lower molar the fifth cusp is usually absent, or only rudimentary in size, but in the lower wisdom tooth it is often present. The fangs of the first and second upper molars are three in number, and divergent; two on the outer or buccal side, one on the inner or palatal side; in the upper wisdom the fangs are frequently partially conjointed, though trifid at the point. The fangs of the first and second lower molars are two in number, an anterior and a posterior, of which the anterior is the larger; they usually curve backwards in the jaw; in the lower wisdom the fangs are usually conjointed, but bident at the point.

The crowns of all the teeth become more or less flattened by use, so that the incisors lose their sharp cutting edge, and the cusps of the premolars and molars are worn away. The temporary or milk teeth are smaller than the permanent teeth. They are more constricted at the neck, where the crown joins the fang, especially in the milk molars, the fangs of which also diverge more widely than in the permanent set. The second temporary molar is bigger than the first. The first upper has three cusps, two buccal, one palatal; that of the second four cusps. The crown of the first lower molar has four cusps; that of the second five, three of which are buccal, two lingual. The temporary teeth lie more vertically in the jaws than the permanent.

The alveolus, or socket in which the lodgment of the single fanged teeth, is a single socket; in the multi-fanged teeth, the socket is divided into two or three compartments, according to the number of the fangs. The socket is lined by the alveolo-dental periosteum, which is continuous at the mouth of the socket with the periosteal covering of the jaw, and with the deeper fibrous tissue of the gum, where it embraces the neck of the tooth. The alveolo-dental periosteum is formed of retiform connective tissue, on the one hand connected with the surface of the cement, on the other with the more fibrous periosteum lining the bony wall of the socket (fig. 15). It is vascular, its vessels being continuous with those of the gum, the pulp-vessels, and the bones. It receives nerves from those going to the pulp. The fang fits accurately in the socket, and through a hole at the tip of the fang the blood-vessels and nerves of the tooth pass into the pulp-cavity of the tooth.

**Structure of the Tooth** — Each tooth is composed of the following hard structures — dentine, enamel, and cement or crista petrosa, occasionally other substances, named osteodentine or vascodentine, are present. In a tooth which has been macerated, an empty space exists in its interior, called the pulp-cavity, which opens externally through the hole at the tip of the fang; but in a living tooth this cavity contains a soft, sensitive substance named the pulp.

The **Dentine**, or ivory, makes up the greater part of each tooth; it is situated both in the crown, where it is covered by the enamel, and in the fang, where it is invested by the crista petrosa, whilst the pulp cavity in the centre of the tooth is a cavity in the dentine. The dentine is composed of an intimate admixture of earthy and animal matter in the proportion of 25 of the animal to 73 of the earthy. The animal matter is resolved on boiling into gelatine, the earthy matter consists mostly of salts of lime.

If thin slices through the dentine of a macerated tooth be examined microscopically, it will be seen to consist of a hard, dense, yellowish-white, translucent matrix, penetrated by minute canals, called dentine tubules. The dentine tubes commence at the pulp cavity, on the wall of which they open with distinct oriëtes. They radiate in a sinusous manner from the pulp cavity through the thickness of the dentine, and terminate by dividing into several minute branches; this division takes place in the crown of the tooth immediately under the enamel, and in the fang of the tooth immediately under the crista petrosa. In their course the dentine tubes branch more than once in a dichotomous manner, and give off numbers of extremely minute collateral branches. The transverse diameter of the dentine tubes near the pulp cavity is a 36th inch, but that of their terminal branches is much more minute.

If the dentine be examined in a fresh tooth, the tubes will be seen to be occupied by soft, delicate, thread-like prolongations of the pulp. The passage of processes of the pulp into the dentine tubes was first seen by Owen in the examination of the task of an elephant; but the soft contents of the dentine tubes have been made the subject of special investigation by J. Tomes in the human and other mammalian teeth, and have been named the destinal fibres.

In sections through the dentine of dried teeth, it is not uncommon to find, near its periphery, irregular, blue
spaces containing air. These spaces freely communicate with each other. As the dentine which forms their boundary has not unfrequently the appearance of globular contours, they were named by Czernik the interglobular spaces. In a fresh tooth they are not empty, but are occupied by a soft part of the matrix, which is traversed in the usual manner by the dentine tubes. This matrix is apparently imperfectly calcified dentine, which shrinks up in a dried tooth, and occasions an air-containing space. A layer of small irregular spaces situated in the peripheral part of the dentine in the fang, immediately under the crusta petrosa, and sometimes named the granular layer, is apparently of the same nature as the interglobular spaces.

The Enamel is the brilliant white layer which forms a cap on the surface of the crown of a tooth. It is thickest on the cutting edge or grinding surface of the crown, and thins away towards the neck, where it disappears. It is not only the hardest part of a tooth, but the hardest tissue in the body, and consists of 96.5 per cent. of earthy and of 3.5 per cent. of animal matter. The earthy matter consists almost entirely of salts of lime. The great hardness of the enamel admirably adapts it as a covering for the cutting edge, or grinding surfaces, of the crowns of the teeth.

The enamel is composed of microscopic rods,—the enamel fibres, or enamel prisms. These rods are set side by side in close contact with each other; one end of each rod rests on the surface of the dentine, the other reaches the free surface of the crown. The rods do not all lie parallel to each other, for whilst some are straight, others are sinuous, and the latter seem to decussate with each other. The rods are marked by faint transverse lines, and are solid structures in the fully formed enamel. When cut across transversely, they are seen to be hexagonal or pentagonal, and about 0.004 inch in diameter.

The free surface of the enamel of an unworn tooth is covered by a thin membrane, named the cuticle of the enamel, or Nasmyth's membrane. This membrane can be demonstrated by digesting an unworn tooth in a dilute mineral acid, when it separates as a thin flake from the free surface of the crown. It is a horny membrane, which resists the action of acid. Its deep surface is pitted for the ends of the enamel rods. As the crown of the tooth comes into use, Nasmyth's membrane is worn off, and the enamel itself by prolonged use is thinned and worn down. In persons who live on hard food, that requires much mastication, it is not uncommon to find the grinding surface of the crowns of the molar teeth worn down quite flat, and the dentine exposed.

The Cement, Crusta Petrosa, or Tooth Bone, forms a thin covering for the surface of the fang of a tooth, and extends upwards to the neck. It is of a yellowish colour, and is usually thickest at the point of the fang; though in the multifanged teeth it sometimes forms a thickish mass at the point of convergence of the fangs. It possesses the structure of bone, and consists of a lamellated matrix with perforating fibres, lacunae, and canaliculi. The lacunae are irregular in size and mode of arrangement, and vary also in the number of the canaliculi proceeding from them. Sometimes the canaliculi anastomose with the branched terminations of the dentine tubes. In the thin cement situated near the neck of the tooth the lacune are usually absent. If the joint between the cut and tooth be softed in acid, and sections be made so as to show the teeth in situ, there is no difficulty in recognizing the cellular masses of nucleated protoplasm within the lacunae, which resemble in appearance the corresponding structures in the adjacent bone. Haversian canals are only found in the cement when it acquires unusual thickness. In old teeth cement thickenst at the tip of the fang, and often closes up the orifice into the pulp cavity; the passage of the nerves and vessels into the pulp is thus cut off, and the nutrition of the tooth being at an end, it loosens in its socket and drops out.

Osteo-dentine and Vaso-dentine do not exist as normal structures in human teeth, though they occur in various animals. They may appear, however, as abnormalities in the human teeth, and are found on the inner wall of the pulp cavity. Osteo-dentine consists of dentine structure, intermingled with lacunae and canaliculi. If vascular canals, like the Haversian canals of bone, are formed in it, then the name vaso-dentine is applied.

The Pulp of the tooth is one of its most important con-Pulp structures. It is a soft substance occupying the cavity in the dentine, or the pulp cavity, and is destroyed in a macerated and dried tooth. It consists of a very delicate gelatinous connective tissue, in which numerous cells are imbedded. Those which lie at the periphery of the pulp are in contact with the dentine wall, and form a layer, named by Kolliker the membrane eloria. As the cells of this layer play a part in the formation of the dentine similar to that performed by the odontoblasts in the formation of bone, Waldeyer has named them odontoblasts. The odontoblasts are elongated in form, and their protoplasm gives off several slender processes; some enter dentine tubes to form the soft dentinal fibres already described; one passes towards the centre of the pulp, to become connected with more deeply-placed pulp cells; whilst others are given off laterally to join contiguous cells of the odontoblast layer. The pulp contains the nerves and blood-vessels of the tooth, which pass into the pulp, through the foramen at the point of the fang. The vessels form a beautiful plexus of capillaries. The nerves are sensory branches of the fifth cranial nerve. They enter the pulp as medullated fibres, which divide into very fine non-medullated fibres, that form a network in the peripheral portions of the pulp. The pulp of the tooth is the remains of the formative papilla, out of which the dentine or ivory has been produced. In adult teeth changes that lead to the production of osteo-dentine and vaso-dentine may take place in it. Through the dentinal fibres an organic connection is preserved between the dentine and the pulp, and
the sensitiveness exhibited by the dentine in some states of a tooth is not necessarily due to the passage of nerves into it, but to its connection with the sensitive dentine pulp.

**Development of the Teeth.** — In studying the development of the teeth, not only has the mode of formation of the individual teeth to be examined, but the order of succession of the different teeth both in the temporary and permanent series.

The teeth are developed in the mucous membrane or gum, which covers the edges of the jaws of the young embryo, and their formation is due to a special differentiation in the arrangement and structure of portions of the epithelial and sub-epithelial tissue of that membrane. The enamel is produced from the epithelium, and the dentine, pulp, and cement from the sub-epithelial connective tissue.

The development of the temporary teeth will first be considered. If a vertical section be made through the mouth of a young human embryo about the sixth or seventh week, its cavity may be seen to be lined by a stratified epithelium, continuous with the layer of stratified epithelium forming the cuticle of the face. Along the edge of the gum, corresponding in position to that of the future jaws, the epithelium is of a more columnar character, and involution of the epithelium into the subjacent connective tissue has taken place. Owing to this involution a narrow groove or groove in the connective tissue is produced, which constitutes the primitive dental groove of Godea. This groove is not, however, an empty furrow, but is occupied by the involuted epithelium. The sub-epithelial connective tissue is soft and gelatinous, and abounds in corpuscles, which are especially abundant in the connective tissue at the base of the groove, where they are produced. These papillae are formed at the bottom of the groove, by an increased development and growth of the corpuscles of the subjacent connective tissue. The base of each papilla is continuous with the subjacent connective tissue, and the apex projects into the deeper parts of the involuted epithelium. As a papilla increases in breadth and length the groove widens and deepens, and the involuted epithelium, increasing in quantity, expands over the apex and sides of the papilla, so as to form a hood-like covering or cap for it. The cap of epithelium constitutes the enamel organ, whilst the papilla is the formation pulp for the dental line and permanent pulp. Whilst these changes are taking place in the epithelial and connective tissue at the bottom of the groove, no commissure widening occurs at its upper part, which remains for a time relatively narrow but retains within it a narrow string of epithelial cells, continuous on the one hand with the epithelial lining of the mouth, and on the other with the enamel organ. This epithelium sends fornns the neck of the enamel organ. After a time, however, the growth of the connective tissue forming the lips of the primitive groove causes the neck of the enamel organ to become prolonged, so that all communication between the enamel organ and the subjacent epithelium is cut off, and the embryo tooth, being now completely included in a cavity or sac, formed by the gelatinous connective tissue of the gums, has entered on what Godea termed its second stage of development.

When included in its sac the embryo tooth, though perfectly soft, acquires a shape which enables one to recognize to what group of teeth it belongs. After a time it begins to harden and to exhibit the characteristic tooth structure.

**The Dental Pulp.** — The dental pulp is more vascular than the surrounding connective tissue, from the blood-vessels of which its vessels are derived. The papilla abounds in cells, which are, in the first instance, rounded and oval in shape. Changes then take place in the cells situated at its periphery, which become elongated and branched, and form layers of cells (odontoblasts). Calcification of the protoplasm of these odontoblasts then occurs, and the peripheral layer of the dentine is produced. In contact with it, and in the interval of the thin film of dentin, a second layer of odontoblasts is then arranged, which, in their turn calcify, and as the process goes on in successive layers of odontoblasts, the entire thickness of the matrix of the dentine and the dentinoid substance is produced. But the process of calcification does not apparently take place throughout the whole thickness of the protoplasm of the odontoblasts, for as Waldeyer pointed out, the axial part of the cells remains undifferentiated as the soft dental fibres of the dentinal tubes. As these changes are going on around the peripheral layers of the odontoblasts, the central part of the dental papilla increases in quantity, apparently as a result of proliferation of its cells; nerves and procaryons, or odontoblasts, in it, and it persists as the soft pulp of the tooth. The papilla of the tooth has essentially, therefore, the same relation to the formation of dentine that the cellulo-vascular contents of the medullary spaces, in intra-auricular ossification, have to the formation of bone. In both instances the hard matrix is due to a special differentiation of the protoplasm of the formative cells; the dental fibres are the equivalent structures to the soft contents of the medullary canals, and the persistent pulp is equivalent to the cellulo-vascular contents of the human canals.

Prior to the embryo tooth becoming calcified, chances had taken place in the enamel organ. Those cells of the enamel organ which lie next the dental pulp are continuous, through the neck of the enamel organ, with the deepest layer of cells of the oral epithelium, which cells are elongated columnar set perpendicularly to the surface on which they rest. Similarly the cells of the deepest layer of the enamel organs are columnar set perpendicularly to the surface of the dental papilla. They undergo a greater elongation, and form six-sided prismatoids which Ennlicher has named the internal or enamel epithelium. The cells of the most superficial layer of the enamel organ lie in contact with the vascular connective tissue which envelopes the embryo tooth. They form the external epithelium of the enamel organ, and slender papillary prolongations of the connective tissue frequently project into this epithelial layer. The osteogenous tissue between its external and its internal epithelium, becomes stellate, and forms with each other an anaestomatous network of cells like those sometimes seen in the gelatinous connective tissue.
After the tooth has become acculturated, and coincident with the transformation of the odontoblastic cells of the dental papilla into dentine, calcification begins in the elongated prismatic cells of the internal or enamel epithelium; then protoplasma becomes calcified, and they become the rods or prisms of the enamel. As the hardening takes place from the periphery to the centre of each cell, the enamel rod grows out, remains soft for some time in the axis of the enamel rod. With the increase in length, and with the calcification of the cells of the enamel epithelium, the stellate odontoblasts disappear, and the outer ends of the enamel rods come in contact with the cells of the external enamel epithelium. By some observers the external epithelium is supposed to disappear without undergoing any special differentiation, but by others it is believed to undergo conversion into Ramay's membrane.

In this manner the crown of a tooth is formed, and it is lodged in a membranous sac formed by the differentiation into a fibrovascular membrane of the surrounding connective tissue. Whilst within its sac, the crown of the tooth possesses the characteristic form of the group of teeth to which it belongs. After the calcification of the enamel rods is completed, it can undergo no further change either in shape or in increase of size.

Whilst the crown of the tooth is being formed, ossification of the jaws has been going on, and the tooth, with its membranous sac, has become lodged in an alveolus or socket in the jaw, which alveolus is closed in by the gum.

In order that the crown of the tooth may come into use as a masticatory organ, it has to be elevated to the level of the gum, which is absorbed by the pressure, and the crown then erupts into the cavity of the mouth. The process of eruption is due to the development of the fang, which, as it grows in length, elevates the crown of the tooth and forces it outward. The dentine of the fang is developed from the odontoblastic cells of the pulp in a similar manner to that already described for the development of the dentine of the crown. The cement or crista pectens is developed from the connective tissue lining the alveolus, which forms the alveo-dental periosteum. It is therefore an ossification in membrane.

As the temporary or milk teeth precede the permanent teeth, their papillae are naturally the first to form. The series of milk-papillae are not, however, simultaneously produced. From the observations of Goodall, it has been shown that the milk-papilla of the anterior molar in the upper jaw appears about the seventh week; then the canine papilla, the two upper premolars, and the posterior molar papilla are successively formed, the last making its appearance about the end of the tenth week. The dental papilla in the upper jaw immediately precedes the papilla of the corresponding teeth in the lower jaw.

The eruption of the milk teeth into the mouth does not begin to take place until the latter half of the first year of extra-uterine life, and is not completed until between the second and third year. Though variations occur in the date of eruption of each tooth in different children, it can be said that the incisors usually appear from the seventh to the ninth month, the anterior molars from the twelfth to the sixteenth month, the canines during the seventeenth to the eighteenth month, the posterior milk molars from two to two and a half years. The milk teeth begin to be shed about the sixth year by the dropping out of the incisors. The last to be shed are the canines, which do not fall out till the tenth or eleventh year. The shedding of the milk teeth is preceded by the absorption of the fangs. This is effected, as was satisfactorily shown by J.

The development of the permanent teeth will now be considered. In the description of the arrangement of the teeth it has been pointed out that the number of teeth in the permanent set exceeds that of the temporary set. The permanent incisors and canines come into the place of the temporary incisors and canines, and the permanent bicuspid succeed the temporary molars, but the permanent molars have no milk predecessors, and are superadded at the back of the dental series.

The development of the succesional permanent teeth, which are the ten anterior teeth in each jaw, will first be examined. Prior to the period when the tips of the temporary dental groove meet to produce the vascular stage of eruption of the several temporary teeth, an indentation, or fovea, takes place in the connective tissue adjoining the string of epithelial cells which forms the neck of the enamel organ. This furrow constitutes what Goodall termed the cavity of reserve, and it is filled up by epithelial cells continuous with the epithelium of the neck of the enamel organ. As a cavity of reserve is formed immediately behind (σ, on the lingual side) of each milk tooth, they are ten in number in each jaw, and, except that for the anterior molar, are formed successively from before backwards.

The cavities of reserve are concerned in the production of the permanent succesional teeth, and each temporary tooth is succeeded by the permanent tooth formed in connection with the cavity of reserve situated immediately behind it (fig 21). The cavities of reserve become elongated, and widened, and pass the temporary teeth in the upper jaw, and below those in the lower jaw. At the bottom of each a dental papilla forms, the apex of which rudiments into the epithelial cells lining the cavity, which forms a cap for the papilla, and constitutes the enamel organ for the permanent tooth. The cavity becomes completely closed by the growth of the surrounding connective tissue, and the embryo permanent tooth becomes acculturated. The process of calcification then goes on, as in the enamel organ and dental papilla, in a manner similar to that already described for the temporary teeth. The permanent teeth then become lodged in sockets in the jaw distinct from those of the temporary teeth. The sac of each permanent tooth remains connected with the fibrous tissue of the gum by a slender fibrous band, or gubernaculum, which passes through a hole in the jaw immediately behind the corresponding milk tooth. Before the succesional permanent tooth erupts, not only should the temporary tooth be shed, but the bony partition between their respective sockets must be absorbed.

The cuspended permanent tooth, or permanent molar, three in number on each side, lies behind the succesional tooth. Their mode of origin is similar to that of the temporary teeth. The process of eruption, occupied by an evolution of the epithelial covering of the gum, is prolonged backwards. Three dental papillae successively appear at the bottom of this groove, and the epithelium lining each papilla becomes converted into an organ. Legrave and Magot, however, state that the second permanent molar arises in connection with a diverticulum (cavity of reserve) proceeding from the epithelial surface of the enamel organs of the first permanent molar, and that the wisdom tooth is formed in connection with a similar diverticulum from the second permanent molar. The embryo tooth becomes acculturated, and goes through the process of calcification similar to what has been described in the other teeth.
The first permanent molar appears about the sixteenth week of embryo life; that of the second permanent molar not until about the twentieth month after birth; whilst that of the wisdom tooth is not formed until about the sixth year. The crowns of the

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Corwall and Kent to Orkney, but it does not occur in Shetland or in some of the eastern counties of England. It flourishes best in siliceous soils, and is not found in the Jura and Swiss Alps. The characters of the plant are as follows — stem erect, roundish, downy, leathery, and from 18 inches to 6 feet or more in height, leaves alternate, narrow, rugose, ovate or elliptical oblong, and of a dull green, with the under surface downy and paler than the upper, radical leaves together with their petioles often a foot in length, root of numerous, slender, whitish fibres, flowers 1½-2½ inches long, pendulous, on one side of the stem, purplish crimson, and hairy and marked with eye-like spots within, segments of calyx acute, acute, cleft to the base, corolla obtuse, with the upper lobe entire or obscurely divided, stamens four and disjunctum (see vol. iv. p. 193, fig. 229); authors yellow and bilabiate; capsules bilvalved, ovate, and pointed, and seeds numerous, small, oblong, pitted, and of a pale brown. As Parkinson remarks of the plant, "It floweth seldom before July, and the seed is ripe in August," but it may occasionally be found in blossom as late as September. In one variety, common in garden, the flowers are white; in another its petals are of a coppery or metallic hue, and not infrequently in cultivated plants several of the uppermost blossoms may be united together so as to form a cup-shaped compound flower, through the centre of which the upper part of the stem passes. A figure of Digitalis purpurea will be found in vol. iv. plate xi. Many species of foxglove with variously-coloured flowers have been introduced into Britain from the Continent. The plants may be propagated by offsets from the roots, but are best raised from seed.

The foxglove (Eng-Sax., foxes-toe, fox’s-toe) is known by a great variety of popular names in Britain. In the south of Scotland it is called bloody fingers, further north, dead-men's-bells; and on the eastern borders, ladies' thimbles, wild mercury, and Scotch mercury. Among its Welsh synonyms are meneg-y-dyffon (elves' gloves), meneg y llygare (fox’s gloves), hysyl collein (red fingers), and hysyl y cew (dog’s fingers) in France its designations are guatte de notre dame, and doux de la Vigne. The German name fingerglut (thimble) suggested to Fuchs, in 1541, the employment of the L-tin adjective digita/us as a designation for the plant.

The leaves, gathered from wild plants when about two-thirds of their flowers are expanded, deprived usually of the petiole and the thicker part of the midrib, and dried, constitute the drug digitalis or digita/us folia of the pharmacopoeia. The preparation is a pale orange and bitter taste; to preserve their properties they must be kept excluded from light in stoppered bottles. They are occasionally adulterated with the leaves of Inula conger, Ploughman's Spikenard, which may be distinguished by their greater roughness, their less divided margins, and their odour when rubbed, also with the leaves of Symphytum officinale, Comfrey, and of Veronica Thapsus, Great Mullein, which unlike those of the foxglove have woolly upper and under surfaces. The powder, infusion, and tincture of digitalis are employed both externally and internally; and its active principle, digestin, may further be used for subcutaneous injection. Digitalis, according to Natturelle, is a crystallizable, neutral, inodorous, bitter substance, of the formula C51H68O14, insoluble in water and ether, but soluble in alcohol and chloroform. The earliest known descriptions of the production are those given by Fuchs andagus about the middle of the 16th century, but its virtues were doubtless known to herbalists at a much remoter period. Gerard, in his Herball (1597), advocates the use of foxglove for a variety of complaints; and John Parkinson, in the Theatre of Plants (1621), tells us that
The Italians have an unusual proverb with them concerning this herb, which is known by them Arrilda, which is Arrilda tuta pungo salis . Arrilda salvet al sordos . . . It hath been found by late experiment to be available for the King's Evil.

Later, Salmon, in The New London Dispensatory, praises the remedy foxglove in no measured terms. Digitalis was first brought prominently under the notice of the medical profession by Dr W. Withering, who, in his Account of the Foxglove (1785), gave details of upwards of 200 cases of dropsical affection, in which it was used. Having become acquainted with the drug in 1775 as an ingredient in a Shropshire family receipt for the cure of dropsy, he began to administer it as a diuretic, but at first in doses too large; for, misled by reasoning from the effect of the aquilegia, which generally acts best upon the kidneys when it excites nausea, 2, 2, he sought to produce the same effect by foxglove. Further experience, however, convinced him that its diuretic effects do not at all depend upon its exciting nausea or vomiting; and that often the urinary discharge may be checked when the dose is immoderately urged so as to occasion sickness. He moreover observed that in cases where the drug produced purging it was ineffective unless combined with small doses of opium, so as to restrain its action on the bowels. Withering seldom found it to succeed in men of great natural strength, tense fibre, warm skin, and florid complexion, or in those with a tight and cordy pulse. He recommended digitalis to every species of dropsy, except the encephalised, and he was of opinion that it might be made subservient to the cure of diseases unconnected with dropsy, and that its power over the motion of the heart, to a degree unobserved by him in any other medicine, might be turned to good account by the physician.

The experiments of Marcet and Brunton show that the infusion of digitalis has a poisonous effect on various plants, and, even in very small quantity, kills fishes,—their successors after death being found distempered, their ventricles strongly contracted. On birds the effect of the infusion is to cause firm contraction of the left ventricle, and consequent excessive congestion of the lungs. A large turkey, according to M. Salerne (Huit de l'Academie, 1746, p. 120, 12mo, and p. 64, 4to ed.), walked as if intoxicated, in consequence of paraking once of foxglove leaves. Another turkey, weighing 7 lb, ate during 4 days about half a handful of the leaves, after which it remained calm, and in a couple of weeks died, its weight being reduced to 3 lb.

Handfield Jones and Fuller have proved that the infusion produces upon the hearts of fowls and mammals effects analogous to those of the drug. The usual results of inhaling repeated doses of digitalis are contraction of the capillaries, and augmented arterial blood-pressure, with slower and more powerful cerebral action. In the urinary secretions, the long-continued doses, besides causing nausea or vomiting, often accompanied by purging, occasion a slow or irregular pulse, dilatation of the capillaries, decrease in the rate of respiration, cold sweats, disordered vaso, chilliness of the extremities, giddiness, and great weakness, followed by convulsions and insensibility. Syncope is apt to occur on sudden changes of posture by patients fully under the influence of the drug. Its cumulative action, or unexpected production of alarmingly acute symptoms, may arise either from an increase in the dose, the elimination of the drug being constant, or from a check in the elimination, the dose remaining unaltered, hence the caution with which digitalis should be administered in cases where the renal functions are disturbed.

The experiments of various physiologists have shown that digitalis, by stimulating the sympathetic ganglia of the heart, causes the contraction of its muscular-motor fibres, this effect being first masked by a similar action on the pneumogastric nerves. By effecting more complete emptying of the ventricles in cases of congested, digitalis unprotected and albuminous excreta about in the lungs a more thorough oxidation of the blood. The consequent increased nutrition of the heart is promotive of hyperactivity; small doses of digitalis are therefore best in assistance in hyperthyrope following upon cardiac injury. In cases of dilatation of the heart, on the other hand, large doses are required to the continued action of the drug that the heart has become sufficiently hyperactive to render venous return excessive. Digitalis calms excitement of the heart not by acting as a narcotic or sedative but by stimulating its nerves, and enabling it to contract without laboured effort. In feeble conditions of the circulation it acts diuretically by increasing arterial tension, but its influence as a diuretic is not constant. Its efficacy in epilepsy appears to be limited by its action on the circulation, in causing fever, or to be effectual when employed to reduce temperature. Its use as a sedative in pneumonia, delirium tremens, and some other diseases has been objected to in the ground that it cuts off the urinary blood supply only by an extreme degree of ventricular contraction. In cachectics in children, in inflammation tending towards secessia, in dropsy, haemorrhage, cerebral anaemia, it is a valuable remedy. Upon the uterina digitalis acts by stimulating the ganglia in which its motor power resides (W. Howship Dickenson, in Med. Chir. Trans. vol xxxi. Lond. 1865). In poisoning by digitalis, aconite and probably also Calabar bean may be resorted to.


P. S. DIGNE, the chief town of the department of Basses-Alpes, in France, about 70 miles from the church of Notre-Dame in 44° 5' 33" N. lat. and 6° 14' 6" E. long. It is built on a spur of the mountains jutting out into a gorge traversed by the Béone, which in winter is a formidable torrent, but in summer is almost dry; and the neighbourhood is rich in orchards, which have long made the town famous for its preserved fruits; and confectations are narrow and tortuous, with the exception of the Boulevard Gassendi, at the upper end of which is a public garden, with a statue of the philosopher, who was born in the neighbouring village of Chantereau. The cathedral within the town is a building of very hybrid architecture, and is of less importance than the cathedral of Notre Dame, in the vicinity, which dates from the 12th century, and is numbered among the historic monuments of France. The thermal springs are not in much repute, and the bathing establishment is in a state of decay. Digne is identified with Dima, the capital of the Avantini and Bodonii. It early became an ecclesiastical see, and its bishop acquired the secular rank of barons of Lanzieres. In the 16th century it suffered on four separate occasions from the Huguenot soldiery; and in modern history it is known as the place from which Napoleon issued his proclamation of March 1815. Population in 1872, 5,000 in the town and 6,000 in the commune.

Dijon (Dino, Dibio, or Dicionemse Castrum), the chief town of the department of Côte-d'Or in France, and formerly capital of the province of Burgundy, is situated at the foot of Mount Affrique, in a fertile plain, on the Burgundy canal, and at the confluence of the Ouche and Suzon, in 47° 19' 19" N. lat. and 5° 2' 5" E. long. The streets are broad and well built of freestone, and there are fifteen squares; an abundant supply of water is obtained from the vale of Suzon by means of a subterranean aqueduct nearly eight miles in length. Among the more noteworthy of the public edifices are the cathedral of St Bénigne, in the Gothic style of the 15th century, with a spire erected in 1749; the church of Notre-Dame, built in 1331–1445, containing a group in stone, the Assumption of the Virgin, by Dubois, and a statue of the Black Virgin, celebrated in the Middle Ages; the church of St Michel, of the 16th century; the general hospital, founded by Otho III. in 1206; the castle, commenced in 1478 by Louis XI., and finished in 1512 by Louis XII., once a state prison, at which the duchess of Maine, Mirabeau, the Chevalier d'Eon, and Toussaint Louverture were confined, and since then a barrack for gendarmes; and the old palace of the dukes of Burgundy, or hôtel de ville, rebuilt between the end of the 17th and the end of the 18th century, in which are an art collection, the archives, a military school of arts, and the salle des gardes, containing the
the tomb of Philippe le Hard and Jean sans Peur. Important
structures also are the lune au yx, the ancient courthou­
se, the theatre, and the hospice Saint-Anne, and numer­
ous other educational establishments. Dijon possesses a
library of 70,000 volumes and 300 manuscripts, a picture
gallery, a collection of coins and of 40,000 engravings,
a jard des plantes and herbanum, and a fine
park, commenced in 1670, after the designs of Le Nôtre,
by the Great Condé, and finished by his son. It is the
seat of a bishop, and of tribunals of primary instance and
power to cut down timber, destroy buildings, &c. (voluntary
waste), or to let buildings fall into disrepair (permissive
waste). In the eye of the law an incumbent is a tenant
for life of his benefice, and any waste, voluntary or permissive,
on his part must be made good by his administrators to his
successor in office. The principles on which such diminu­
tions are to be ascertained, and the application of the money
payable in respect thereof, depend partly on old ecclesiasti­
cal law and partly on recent Acts of Parliament. Questions
as to dilapidations usually arise in respect of the residence
house and other buildings belonging to the living
Inclusions, hedges, ditches, and the like are included in
things “of which the beneficed person hath the burden
and charge of repairation.” In a leading case (Ross v.
Adecock, 31 Law Journal, C.P. 290) it was said that the
court was acquainted with no precedent or decision extend­
ing the liability of the executors of a deceased incumbent
to any species of waste beyond dilapidation of the house,
chancel, or other buildings or fences of the benefice. And
it has been held that the mere mismanagement or mascul­
tation of the ecclesiastical lands will not give cause to an
action for dilapidations. To place the law relating to
dilapidations on a more satisfactory footing, the Act 34
and 35 Vict c. 43 was passed. The buildings to which the
Act applies are defined to be such houses of residence,
chancels, walls, fences, and other buildings and things as
the incumbent of the benefice is by law and custom bound
to maintain in repair. In each diocese a surveyor is to be
appointed by the archdeacons and rural deans subject to the
approval of the bishop, and such surveyor shall by the
direction of the bishop examine the buildings on the follow­
ing occasions—viz., 1, when the benefice is sequestrated,
2, when it is vacant, 3, at the request of the incumbent or
on complaint by the archdeacon, rural dean, or patron
The surveyor is to specify the works required, and to give
an estimate of their probable cost. In the case of a vacant
benefice, the new incumbent and the old incumbent or his
representatives may lodge objections to the surveyor’s
report on any grounds of fact or law, and the bishop, after
consideration, may make an order for the repairs and their
cost, for which the late incumbent or his representatives are
liable. The sum so stated shall be a debt due from the
late incumbent or his representatives to the new
incumbent, who shall pay over the money when recovered
to the governors of Queen Anne’s Bounty. The governors
pay for the works on execution on receipt of a certificate
from the surveyor; and the surveyor, when the works have
been completed to his satisfaction, shall give a certificate to
that effect, the effect of which, so far as regards the
incumbent, will be to protect him from liability for dilap­
dations for the next five years. Unnecessary buildings
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An amending statute (55 and 56 Vict. c. 96) relates chiefly
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by Story (On Bouments) as “the degree of diligence which
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Sir William Jones—“That care, which every person of
common prudence and capable of governing a family takes of
"The Fabhs are an unswall poore with them concerning this herb, called by them Arula, which is Arula tua gophie mula : Arula salveth all nores ... It hath been found by late experience to be valueable for the King of France, ... also to be effectual against Failing Stomach, that Others have been cured thereby."

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Digitalis was first brought prominently under the notice of the medical profession by Dr W. Withering, who, in his Account of the Foxglove (1775), gave details of upwards of 200 cases, chiefly experimental, in which it was used. Having become acquainted with the drug in 1775 as an ingredient in a Shropshire family receipt for the cure of dropy, he began to administer it as a diuretic, but at first in doses too large; for, "mingled by reasoning from the effect of the squills, which generally acts best upon the kidneys when it excites nausea," he sought to produce the same effect by fogxove. Further experience, however, convinced him "that its diuretic effects do not at all depend upon its exciting nausea or vomiting;" and that often the urinary discharge may be checked when the dose is imprudently urged so as to occasion sickness. He moreover observed that in cases where the drug produced purging it was inefficacious unless combined with small doses of opium, so as to restrain its action on the bowels. Withering seldom found it to succeed in men of great natural strength, tense fibre, warm skin, and florid complexion, or in those whose tongue and cordy pulse. He recommended digitalis "in every species of dropy, except the enysted;" and he was of opinion that it might be made subservient to the cure of diseases unconnected with dropy, and that its power over the motion of the heart, to a degree unobserved by him in any other medicine, might be turned to good account by the physician.

The experiments of Maret and Brunton show that the infusion of digitalis has a poisonous effect on various plants, and, even in very small quantity, kills fishes,—their auricles after death being found distended, their ventricles strongly contracted. On birds the effect of the infusion is to cause firm contraction of the left ventricle, and consequent excessive congestion of the lungs. A large turkey, according to M. Sallen, in the Journal des Scienes, 1748, p. 190, 312mo, and p. 84, 4to ed.), walked as if intoxicated, in consequence of partaking of foxglove leaves. Another turkey, weighing 7 lb, ate during 4 days about a handful of the leaves, after which it refused nourishment, and in a couple of weeks died, its weight being reduced to 3 lb. Handfield Jones and Faller have proved that the infusion of foxglove leaves on the hearts of frogs and a number of small mammals acts in a manner similar to that observed in birds. The usual results of small and repeated doses of digitalis are contraction of the capillaries, and augmented arterial blood-pressure, with slower and more powerful cardiac systole, and an increase in the urinary secretions; large and long-continued doses, besides causing nausea or vomiting, often accompanied by cough, occasion a slow or irregular pulse, dilatation of the capillaries, increase in the rate of respiration, cold sweats, disordered vision, chilliness of the extremities, piddiness, and great weakness, followed by convulsions and insensibility. Syncope is apt to occur on sudden changes of posture by the patient, fully under the influence of the drug. Its cumulative action, or unexpected production of alarming acute symptoms, may arise either from an increase in the dose, the elimination of the drug being constant, or from a check in the elimination, the dose remaining unaltered, hence the caution with which digitalis should be administered in cases where the renal functions are disturbed.

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toms of Philippe le Hard and Jean sans Peur. Important structures also are the lunatic asylum, the ancient courthouse, the theatre, and the hospice Saint-Anne, and numerous other educational establishments. Dijon possesses a library of 70,000 volumes and 500 manuscripts, a picture gallery, a collection of coins and of 40,000 engravings, a jardin des plantes and herbarium, and a fine park, commenced in 1670, after the designs of Le Notre, by the Great Condé, and finished by his son. It is the seat of a bishop, and of tribunals of primary instance and commerce, and has faculties of law, science, and literature. The ramparts that formerly surrounded the town have been replaced by broad avenues. The principal industries are the manufacture of hosery, woollen and cotton cloth, Paris lace, leather, candles, earneware, mustard, confections, vinegar, and chemicals; iron and type-founding, printing and binding, brewing, saltpetre-refining, and nursery-gardening. Dijon does an important trade in cereals, and is the chief emporium for Burgundy wines. The population of the commune in 1873 was 43,733; that of the town, 40,115.

Dijon was a fortified camp of the Romans, and about 274 was enlarged by Aurelian. In 731 it was taken and burnt by the Saracens. Councils were held there in 1077, 1116, and 1199 or 1200. Early in the 12th century the town was almost entirely destroyed by fire, but it was soon rebuilt. Till 1107 it was held by the counts of Dijon, and from 1179 to the death of Charles the Bold in 1477 it was the residence of the dukes of Burgundy, it then came into the possession of Louis XI., who established there the Burgundian "Parlement." In 1513 Dijon was besieged by 20,000 Swiss, with whom a humiliating treaty was concluded. On October 31, 1670, the town capitulated to General Werder; it was evacuated by the Germans on the 27th of December, and early in January 1711 became the head-quarters of the French eastern army under Bourbon. On the 1st of the following February it was reoccupied by the Germans. Dijon is the birthplace of Bossuet, Jacques Cochet, the elder Codalain, Dubuclay, Jeffroy, Longpré, Bernard de la Mongière, Guyot de Moreve, Piron, Rameau, and Stamnaus.

DILAPIDATIONS, in English law, is the same given to the waste committed by the incumbent of an ecclesiastical living. By the general law a tenant for life has no power to cut down timber, destroy buildings, &c. (voluntary waste), or to let buildings fall into disrepair (permissive waste). In the eye of the law an incumbent is a tenant for life of his benefice, and any waste, voluntary or permissive, on his part must be made good by his administrators to his successor in office. The principles on which such dilapidations are to be ascertained, and the application of the money payable in respect thereof, depend partly on old ecclesiastical law and partly on recent Acts of Parliament. Questions as to dilapidations usually arise in respect of the residence house and other buildings belonging to the living. Inclusions, hedges, ditches, and the like are included in things "of which the beneficed person hath the burden and charge of repair." In a leading case (Ross v. Adcock, 37 Law Journal, C.P. 290) it was said that the court was acquainted with no precedent or decision extending the liability of the executors of a deceased incumbent to any species of waste beyond dilapidation of the house, chancel, or other buildings or fences of the benefice. And it has been held that the mere mismanagement or miscultivation of the ecclesiastical lands will not give rise to an action for dilapidations. To place the law relating to dilapidations on a more satisfactory footing, the Act 34 and 35 Vict. c. 43 was passed. The buildings to which the Act applies are defined to be such houses of residence, chancels, walls, fences, and other buildings and things as the incumbent of the benefice is by law and custom bound to maintain in repair. In each diocese a surveyor is to be appointed by the archdeacons and rural deans subject to the approval of the bishop, and such surveyor shall by the direction of the bishop examine the buildings on the following occasions, viz. 1, when the benefice is sequestered; 2, when it is vacant; 3, at the request of the incumbent or on complaint by the archdeacon, rural dean, or patron. The surveyor is to specify the works required, and to give an estimate of their probable cost. In the case of a vacant benefice, the new incumbent and the old incumbent or his representatives may lodge objections to the surveyor's report on any grounds of fact or law, and the bishop, after consideration, may make an order for the repairs and their cost, for which the late incumbent or his representatives are liable. The sum so stated shall be a debt due from the late incumbent or his representatives to the new incumbent, who shall pay over the money when recovered to the governors of Queen Anne's Bounty. The governors pay for the works on execution on receipt of a certificate from the surveyor; and the surveyor, when the works have been completed to his satisfaction, shall give a certificate to that effect, the effect of which, so far as regards the incumbent, will be to protect him from liability for dilapidations for the next five years. Unnecessary buildings belonging to a residence house may, by the authority of the bishop and with the consent of the patron, be removed. An amending statute (35 and 36 Vict. c. 96) relates chiefly to advances by the governors of Queen Anne's Bounty for the purposes of the Act.

DILIGENCE, in law, is the care which a person is bound to exercise in his relations with others. The possible degrees of diligence are of course numerous, and the same degree is not required in all cases. Thus a mere depositary would not be held bound to the same degree of diligence as a person borrowing an article for his own use and benefit. Jurats, following the reasons of the civil law, have incurred in fixing three approximate standards of diligence—viz., ordinary, less than ordinary, and more than ordinary. Ordinary or common diligence is defined by Story (On Bailments) as "that degree of diligence which men in general exert in respect of their own reputations. So Sir William Jones—"Thus care, which every person of common prudence and capable of governing a family takes of
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his own concerns, is a proper measure of that which would uniformly be required in performing every contract, if there were not strong reasons for exacting in some of them a greater and permitting in others a less degree of attention." (Essay on Bailments). The highest degree of diligence would be that which only very prudent persons bestow on their own concerns; the lowest, that which even careless persons bestow on their own concerns. The want of these various degrees of diligence is negligence in corresponding degrees. These approximations indicate roughly the greater or less severity with which the law will judge the performance of different classes of contracts; but English judges have been inclined to regard the distinction as a useless refinement of the jurisprudence. Thus Baron Rolfe could see no difference between negligence and gross negligence; it was the same thing with the addition of a vituperative epithet. See NEGLIGENCE.

Diligence, in Scots law, is a general term for the process by which persons, having or effects are attached on execution, or in security for debt.

DILKE, Sir Charles Wentworth (1810–1869), Baronet, born in London, February 18, 1810, was the only son of Charles Wentworth Dilke, proprietor and editor of the Athenæum, and was educated at Westminster school and Trinity Hall, Cambridge. He studied law, and in 1834 took his degree of LL.B.; but he did not enter upon the practice of his profession. He assisted his father in his literary work, and afterwards gave up much of his time to several of the learned societies. He was for some years chairman of the council of the Society of Arts, and took a prominent part in the affairs of the Horticultural Society. He was one of the most zealous promoters of the Great Exhibition (1851), and a member of the executive committee. At the close of the exhibition he was honoured by foreign sovereigns, and the Queen offered him knighthood, which, however, he did not accept, he also declined a large remuneration offered by the royal commission. In 1853 Dilke was one of the English Commissioners at the New York Industrial Exhibition, and prepared a report on it. He again declined to receive any money reward for his services. He was appointed one of the five royal commissioners for the Great Exhibition of 1852; and soon after the death of the Prince Consort he was made baronet by the Queen. In 1868 he entered parliament as member for Wallingford. In 1869 he was sent to Russia as representative of England at the Horticultural Exhibition held at St Petersburg. His health, however, had been for some time failing, and he died suddenly in that city, May 10, 1869. He was a fellow of the Society of Antiquaries, and a member of other learned bodies.

DILL (Anethum), a genus of umbelliferous plants having compound leaves; umbels without involucre; yellow flowers, with calices incomplete above; and lenticular fruit, compressed from back to front, flattened at the margin, and presenting on each side three ridges. The common species, A. graveolens, is indigenous to the south of Europe, Egypt, and the Cape of Good Hope. It resembles fennel in appearance. Its root is long and fusiform; the stem is round, jointed, and about a yard high; the leaves have fragrant foliules; and the fruits are brown, oval, and concavo-convex. The plant flowers from June till August in England. The seeds are sown preferably as soon as ripe, either broadcast or in drills between 8 and 12 inches asunder. The young plants should be thinned when three or four weeks old, so as to be at distances of about 10 inches. A sheltered spot and dry soil suit the plant for the production of the seed in the climate of England. The leaves of the dill are used in soups and sauces, and, as well as the umbels, for flavouring pickles. The seeds are employed for the preparation of dull-water and oil of dill (valued for their carminative properties), are largely consumed in the manufacture of gin, and, when ground, are eaten as a condiment in the East. See BOTANY, vol. iv. p. 123.

DILLEN [Dillellus], Johann Jakob (1687–1747), a distinguished botanist, was born at Darmstadt. He was educated at the university of Gisseners, where he received his doctor's diploma, but he early turned his attention from medicine to the study of plants. Whilst at Giessen he wrote several botanical papers for the Ephemerides Naturae Curiosarum, and in 1719 he printed there his Catalogus Plantarum sponte circa Giessens asacentum, a little octavo volume illustrated with figures drawn and engraved by his own hand, and containing descriptions of many new genera. In the preface he discusses the classifications of Rivinus, Tournefort, Knaat, and Ray, the last of which was that adopted by him. In 1718 Dillen became acquainted in London with the botanist, Vincent Linnæus, who invited him to come to England. Soon after his arrival there, in 1721, he took up his abode at Oxford, where Sherard resided. In 1724 he published an enlarged edition of Ray's Synopsis Stirpium Britannicarum. In accordance with the will of Sherard, who died in 1726, Dillen was appointed professor of botany at Oxford. He published in 1732, in two volumes folio, with 324 plates executed by himself, the Hortus Elthamensis, of which Linnaeus wrote—"Est opus botanicum quo absolutius mundus non visit." That naturalist spent a month with Dillen at Oxford in 1736, and afterwards dedicated to him his Crítica Botanica. In 1741 appeared the Historia Museorum of Dillen, to whom and his contemporary Micheli (1679–1731) cryptogamic botany owes its origin. He died April 2, 1747, in his sixtieth year. A print from his picture at Oxford is to be seen in Sim and König's Annals of Botany, vol. ii. His books and collection of mosses, with many drawings, were bought by his successor at Oxford, Dr Humphrey Sibthorp, and added to the Sewardian Museum.

DILLINGEN, a town of Bavaria, in the circle of Schwaben-Neuburg, on the left bank of the Danube, 24 miles north-west of Augsburg. Its principal structures are the royal palace, formerly the residence of the bishops of Augsburg, the royal gymnasium and Latin school, with a library of 75,000 volumes, five churches, two episcopal seminaries, a Capuchin monastery, a Franciscan nunnery, and a deaf and dumb asylum. The university, founded in 1549, was abolished in 1804, being converted into a lyceum. The inhabitants, who in 1875 numbered 5025, are engaged in cattle-rearing, the cultivation of corn, hops, and fruit, ship-building and the shipping trade, and the manufacture of cloth, paper, and cutlery. Dillingen was taken by the Swedes in 1632 and 1648, by the Austrians in 1702, and on the 18th July 1800 by the French.

DIMENSIONS. In geometry a line is said to be of one dimension, a surface of two, and a solid of three dimensions. The use of the word is extended to algebraical terms, which are said to be of n dimensions with respect to any quantity when that quantity enters to the nth power. If the term contains several variables, x, y, z, &c., and if the sum of the indices of these variables is n, the term is said to be of n dimensions with respect to the system of variables x, y, z.

If all the terms of an equation are of n dimensions with respect to the system of variables x, y, z, the equation is said to be homogeneous of n dimensions with respect to the system of variables.

The equation may or may not be homogeneous with respect to another system of variables which occur in it, as p, q, r.
If all the variables of a system with respect to which the equation is homogeneous are increased in the same ratio, the equation will still be true.

The general equations occurring in the application of mathematics to natural phenomena are equally true whatever units we employ for the measurement of the different quantities which enter into them, provided we employ the same units throughout the equation. Hence such equations must be homogeneous with respect to any system of variables which is referred to the same unit, and all quantities essentially numerical, such as exponents and exponents, logarithms, angles, and circular and elliptic functions, must be of zero dimensions.

There are two methods of interpreting the equations relating to geometry and other concrete sciences.

We may regard the symbols which occur in the equation as of themselves denoting lines, masses, times, &c.; or we may consider each symbol as denoting only the numerical value of the corresponding quantity, the concrete unit to which is referred being tacitly understood.

If we adopt the first method we shall often have difficulty in interpreting terms which make their appearance during the calculations. We shall therefore consider all the written symbols as mere numerical quantities, and therefore subject to all the operations of arithmetic during the process of calculation. But in the original equations and the final equations, in which every term has to be interpreted in a physical sense, we must convert every numerical expression into a concrete quantity by multiplying it by the unit of that kind of quantity.

Thus, if we write \( [L] \) for the unit of length, that is to say, the actual concrete centimetre or foot, and if \( x \) denotes the numerical value of a certain line, then the complete expression for the line is \( x [L] \); and if \( y, z, \&c. \), are the numerical values of other lines, then the complete expression for the quantity whose numerical value is \( x^2y^3x^4z^5 \), and this quantity is said to be of \( a + 5 \beta + y \) dimensions with respect to \( [L] \), the unit of length.

There must be as many different units as there are different kinds of quantities to be measured, but in all dynamical sciences it is possible to define these units in terms of the three fundamental units of length, time, and mass. We therefore suppose these three fundamental units to be given, and deduce all the others from these by the simplest attainable definitions.

The equations at which we arrive must be such that a person of any nation, by substituting for the different symbols the numerical values of the quantities as measured by his own national units, would obtain a true result.

This can only be the case if the equation is homogeneous with respect to each of the fundamental units. To ascertain if it is so we must count the dimensions of every term, and for this purpose we must know the dimensions of any derived units which enter into the equation. The theory of the dimensions of physical quantities were first stated by Fourier, Théorie de Chaleur, sec. 160.

By knowing the dimensions of any quantity we are able at once to deduce its numerical value as expressed in terms of one system of units from its numerical value as given in terms of another system.

Thus, magnetic measurements have been made according to the British system, in which the foot, the grain, and the second of mean time are the fundamental units. Other magnetic measurements have been made according to systems derived from the French metre system, using the metre, the gramme, or the millimetre as unit of length, the kilogramme, gramme, or millimilligrammre as unit of mass, and the second as unit of time. In recent times an effort has been made to procure the adoption for all scientific measurements of a system in which the centimetre, grammé, and second are the units. This is sometimes referred to as the C. G. S. system, and a copious list of examples of the measurement of physical quantities in this system, of its comparison with other systems, and of the dimensions of quantities occurring in all branches of physics, has been published by Dr Everett, and published by the Physical Society of London and by Taylor and Francis, under the title Illustrations of the C. G. S. System of Units.

The three fundamental units may be selected each independently of the others, in an entirely arbitrary manner. It is possible, however, by taking advantage of the permanence of the properties of natural substances, so to define the units that one or more of them may be reproduced without reference to any material standard at present existing.

Thus, if the density of a standard substance in a standard state, such as water when at its maximum density under the pressure of its own vapour, is defined as the unit of density, then the unit of mass may be derived from the unit of length, or vice versa. In this system, therefore, the dimensions of mass in terms of length are \( L \), or of length in terms of mass, \( M \).

We may define the three fundamental units without reference to any actual body, but by means of a natural substance such as water. For if the solid, liquid, and gaseous states of pure water are in equilibrium in a vessel containing no other fluid, the pressure and temperature of the system are determinate. We may therefore define the unit of density in terms of the density of the liquid water under these conditions, and the unit of pressure in terms of the pressure in the vessel. We may derive the third unit from the law of gravitation, and define the unit of time in terms of the time of revolution of a satellite about a sphere having the unit density at a distance equal to the radius. Thus time must be calculated from the results of experiments on attraction. Having thus obtained a density, a pressure, and a time, the magnitudes of which are the same under all circumstances, we can derive from them standards of length and mass. For the dimensions of the unit of density \( D \) are \([ML^{-1}]\), and those of the unit of pressure \( F \) are \([ML^{-1}T^{-2}]\), so that the dimensions of \( [L] \) are \([IP + IT^{-1}T^{-2}]\), and those of \( [M] \) are \([IP + IT^{-1}T^{-2}]\).

This method of defining the three fundamental units is suggested, not as being at all comparable in point of accuracy with the usual methods, but as being an example of a method independent of the preservation of any material standards, whether artificial, as those kept by Government, or natural, as the earth, and its time of revolution.

(D. C. M.)

DINAJPUR, a district of British India, within the Rajshahi-Kuch-Belhar division or commissionship, under the lieutenant-governor of Bengal, is situated between 24° 43' 40" and 26° 22' 50" N. lat., and between 88° 4' 0" and 89° 21' 5" E. long. The district, which occupies an area of 4126 square miles, is a triangular tract of country with the acute angle towards the north, lying between the districts of Jalpaiguri and Raiganj on the E., and Purnia on the W.; on the S. it is bounded by the districts of Bogra, Rajshahi, and Maldah. The country is generally flat, but towards the south becomes undulating, some of the elevations being about 100 feet in height. The district is traversed in every direction by a network of channels and water courses. Along the banks of the Kuch and the undulating ridges and long lines of mango-trees give the landscape an aspect of beauty which is not found elsewhere.
Dinajpur forms part of the rich arable tract lying between the Ganges and the southern slopes of the Himalayas. Although essentially a fluvial district, it does not possess any river navigable throughout the year by boats of 4 tons burden. Rice forms the staple agricultural product. It consists of three species, the dham or winter rice (the great harvest of the year), the dus or autumn rice, and the boro or spring rice. The dham and dus rice are each subdivided into several varieties. The other crops are oats, barley, millet, maize, oilseeds, pulses, jute, sugar-cane, betel leaf, tobacco, and vegetables. The imperial road from Barhampur to Dinajpur runs through the district for a distance of about 130 miles, and the new Northern Bengal State Railway intersects the district for about 30 miles. The climate of the district, although cooler than that of Calcutta, is very unhealthy, and the people have a sickly appearance. The worst part of the year is at the close of the rains in September and October, during which months few of the natives escape fever. The average maximum temperature in 1872 amounted to 1,501,924 souls, equal to 364 persons per square mile,—the Hindus forming 48.8 per cent., and the Muslims 51.2 per cent.

Dinant, the principal town and administrative headquarters of the above district, is situated on the east bank of the Purnabhâb river, in 25° 35' 0" N. lat. and 88° 40' 46" E. long. The town seems to have declined in importance of late years. In 1808 it was estimated to contain 5000 houses, the census of 1872 returned only 3031. Population in 1872: Hindus, 5847; Mahometans, 7016; Christians, 99; others, 80.—total (7700 males and 5312 females), 13,042. The disparity in the proportion of the sexes arises from the fact that many of the shopkeepers and traders have houses in the country where they leave their wives and children.

Dinan, a town of France, in the department of Côtes du Nord, about fifteen miles inland, on the left bank of the Rance. The river is navigable for vessels of 150 tons up to the foot of the great granite viaduct which was completed in 1852 across the ravine between the town and the suburb of Lanvally. The town has a highly picturesque appearance, not only from the position which it occupies on the rocky heights above the river, but also from the numerous remains which it still preserves of the architecture of earlier days. There are considerable portions of the ancient ramparts and towers; the castle of the 14th century still looks down from its height; and many of the houses in the Rue de la Grande and the Rue de la Lardere can boast of almost equal antiquity. Of the public buildings may be mentioned the church of St Sauveur, dating from the 12th to the 16th century; the church of St Malo; the townhouse, which was formerly a hospital; and the monastery of the Capuchins, now used as a benevolent institution. Besides a good general trade, the inhabitants carry on the manufacture of linen, sailcloth, cotton, thread, beetroot-sugar, and salt. About half a mile from the town are the ruins of the castle and the Benedictine abbey at Lehon, of which the latter is called in the country the Chapelle des Beausonnors; near the neighbouring village of St Esprit stands the large lunatic asylum of Les Bas Poins, founded in 1856; and at no great distance is the now dismantled chateau of La Garaye, which was rendered so famous in the 18th century by the philanthropic devotion of the count and countess whose story is told in Mrs Norton's well-known Lady of La Garaye. The principal event in the history of Dinan is the siege by the English under the duke of Lancaster in 1339, during which Dinan was taken and an English knight called Thomas of Canterbury engaged in single combat. The memory of the Breton hero's victory is preserved by the name of the Place Duysenius, which marks the site of the lists.

Population in 1886, 6428.

Dinant, a town of Belgium, at the head of an arrondissement in the province of Namur, about twelve miles south of Namur, on the railway between that city and Givet. It occupies a narrow site between the River Meuse and a rocky limestone hill which is crowned by a castle; its streets are consequently short and crowded, and a considerable number of its houses are built on terraces cut out on the declivity. A cathedral of the 13th century, richly decorated in the interior, two hospitals, and a Latin school are its principal buildings; and among its industrial establishments are paper-mills, glass-factories, salt-refineries, oil-mills, flour-mills, and works for the cutting and polishing of the black marble which is quarried in the neighbour­hood. Population in 1886, 6428.

Dinant is a place of great antiquity. A church was consecrated there in 638, and a second in 704. It did not, however, rise to any importance till the 11th century. In the 12th century it was reckoned a place of great strength, and had attained considerable wealth by means of its industry, especially in the manufacture of copper wares, which were familiarly known as Donanderie. In 1466 Philip the Good, duke of Burgundy, took and destroyed the town and its fortifications; but, three years later, his successor, Charles, allowed it to be rebuilt. It was taken and pillaged by the French in 1554, and again in 1675. By the treaty of Aquisgran in 1678 it was restored to the Bishop of Liége, but captured by the French in 1794, and became the capital of an arrondissement in the department of Sambre-et-Meuse.

Dinapur, a town and military station of Behar India, is situated on the right or south bank of the Ganges, and on the East Indian Railway, in the district of Patna, province of Behar, about ten miles west of Patna. The town, which stretches along the river bank for about a mile, consists mostly of thatched cottages, one story high, and is not laid out with regard to order or symmetry. Several handsome villas, however, surround the place—the residences of the European officers and the richer natives. Barracks sufficiently large to accommodate 1200 men are situated in Dinapur. In 1837 the sepoy garrison of the place took part in the mutiny of that year, but after a conflict with the European troops were forced to retire from the town. Population about 18,000.

Dinarchus (Diôny ска), the orator, son of Sostratus, was born at Corinth about 470 B.C. (Plut. Dem. 5). Thus, like at least one greater member of the decade, Lysias, this last of the Attic orators was not an Athenian citizen. But his career at Athens, as a resident alien, was at least commenced early in life. When not more than twenty-five, he was already active as a writer of speeches for the law courts. He had been the pupil both of Theophrastus and of Demetrius Phalereus, and had early gained a certain fluent force, and a versatile command of style, which gave him some oratorical repute. His first important contact with public life was in 324 B.C. The Areopagus, after inquiry, reported that nine men had taken bribes from Harpalus, the fugitive treasurer of Alexander. Ten public prosecutors were appointed. Dinarchus wrote, for one or more of these prosecutors, the three speeches which are still extant—one "Against Demothenes," one "Against Aristoc­ton," one "Against Philoedes." The authenticity of the speech against Demothenes was indeed denied by Demetrius of Magnesia, chiefly on the ground that it is largely composed of matter taken from Eschines. Wester­mann went further, and doubted the genuineness of all three speeches. But Schafer—who justly remarks that the absence of originality and of character is itself characteristic of Dinarchus—is probably right in accepting the general opinion that they are authentic.
Macedonian control. Little as the man's life, so far as we know of it, engages our respect or esteem, his position must at least be broadly distinguished from that of such a man as Aeschines, an Athenian citizen who, while his city could still be saved, abdicated its enemies—or from that of such a hureling as Demosthenes. In the Harpocration affair, Demosthenes was, beyond all reasonable doubt, innocent, and so, probably, were others of the accused. Yet Hyperdemos, the most fiery of the patriots, was on the same side as Dinarchus.

Under the regency—for such it really was—of his old master, Demetrius Phalereus, Dinarchus had much political influence. The years 317-306 B.C. were the most prosperous of his life. On the fall of Demetrius Phalereus, Dinarchus withdrew into exile at Chalcis in Euboea. About 293 B.C. he ventured to return to Athens, and took up his abode with a former associate, Proxenus, in the country, against whom he afterwards brought an action, on the ground that Proxenus had robbed him of some money and plate which he had brought with him. He died at Athens, at the age of about seventy, i.e., about 291 B.C.

Dionysius held that, out of 86 extant speeches bearing the name of Dinarchus, 58 were genuine, 28 in private causes, 30 in private causes. In addition to the three speeches above mentioned, we have scanty fragments of 86 more which passed, with at least some authors, under his name. This number need not surprise us, when we remember that Suidas speaks of 150 speeches of Dinarchus, and (following Caelius probably) allows 60 as genuine. No orator of the Attic decadec had so little of an individual style, and to no other, consequently, was alien work so largely ascribed by the Alexandrines to Dinarchus imitated by turns the style of Lysias, of Hyperides, of Demosthenes. As Dionysius says of him, odisse arev akroba ator' dianor ovale, he had no general stamp of his own, no distinctive trait. He was neither an inventor, like Lysias, Isocrates, and Isaeus, nor a perfectionist like Aeschines, Hyperides, and Demosthenes. He is called by Hermogenes α επιθετος Διονομορφος—a metaphor taken either from barley compared with wheat, or, better perhaps, from beer compared with wine—a Demosthenes whose strength is rougher, and who has neither the flavour nor the sparkle.

Our best MSS. are the Codex Cyprianus and the Codex Oromantiae (containing also Antiphon, Andocides, Isaeus, Lysias). The three extant orations, with the fragment ascribed to Demeades, ed. F. Blunt, Lips 1871. The fragments in Butler and Saunt's Orationes Attici, vol. ii.

DINGWALL, a royal burgh of Scotland, the county town of Ross-shire, 15 miles north-west of Inverness, at the junction of the river Spey and the River Affric. It occupies a low situation at the upper end of Cromarty Firth, where the valley of Strathpeffer unites with the alluvial lands at the mouth of the Conon. Though a neatly built and thriving place, it has nothing special to show except the curious old town-house, a few remains of the ancient mansion-house of the powerful family of Ross, and an obelisk 57 feet in height, erected to the memory of George, first earl of Cromarty. Dingwall, like so many towns on the same coast, is of Norse origin, and its name in Scandinavian signifies the Court Hill. In Gaelic it is known as Inbhir-pasron, or the mouth of the Fother, its charter, granted by Alexander III, was renewed by James IV. It unites with Tain, Dornoch, Wick, Kirkwall, and Cromarty in returning one member to Parliament. Population in 1871, 2125.

DINHELSBUHL, a town of Bavaria, in the department of Mittelfranken, or Mühl Franconia, on the Wurme, about 40 miles by rail from Dornsau, worth which the river joins the Danube. It is an important centre both of civil and ecclesiastical administration, and has a Roman Catholic and a Protestant church, a Latin and industrial school, and several benevolent institutions. The inhabitants carry on the manufacture of gloves, stockings, and other articles, and deal largely in cattle. Fortified by Henry I, Dinkelsbühl received in 1205 the same municipal rights as Ulm, and obtained in 1351 the position of a free imperial city, which it retained till 1803. Its municipal code, the Dinkelsbühler Recht, printed in 1536, and republished in a revised form in 1738, contained a very extensive collection of laws on matters both of public and private interest. Population in 1871, 5238.

DINOCHATES (called by Pliny Dinocharis), a Greek architect, who lived in the reign of Alexander the Great, to whom he applied his couriers for an introduction to the Macedonian king, but was put off from time to time with vain promises. Impatient at the delay, he is said to have laid aside his usual dress, besmeared his body with oil in the manner of an athlete, thrown a lion's skin over his shoulders, and, with his head adorned with a wreath of palm branches, and a club in his hand, made his way through a dense crowd which surrounded the royal tribunal to the place where the king was dispensing justice, assuming the strange sight, Alexander asked him what it was. He replied that he had come into the royal presence to make known a scheme which would be worthy of the consideration of the greatest monarch in the world. Out of Mount Athos, a mountain rising like a pyramid to a height of 6700 feet topped with a cone of white limestone, he proposed to construct the gigantic figure of a man, holding a large city in his right hand, while in his left he held a gigantic tank large enough to contain all the water from the fountains in the peninsula. The story goes that the king was not displeased with the idea, but, as he thought it chimerical, it came to nothing. Alexander, however, was so delighted with the man, and with his bold and daring conceptions, that he carried Dinocrates with him when he went on his campaigns against Darius. He was employed by the king to design and lay out the city of Alexandria. This city was founded in 332 B.C., but the untimely death of Dinocrates prevented him from assuming the proportions intended by its designer. The Ephesians, whose temple of Dana had just been burnt down, employed him in its reconstruction. But perhaps the most original of all his conceptions was his design for a temple to Artemis, wife of Pollux, 11th king of Egypt. The roof of the building was to have been composed of a mass of leadstones, strong enough to hold floating in the air, and suspended within it, an iron statue of the queen.

DINORNIS (διονερνος, terrible, and δωρος, bad), a genus of gigantic Struthious birds, but believed to be extinct, which in post-Phocian times must have formed a principal feature in the fauna of New Zealand. Their remains are found in greatest abundance in the provinces of Otago and Canterbury, often strewed in great profusion over the surface of the ground, but more usually met with buried in alluvial deposits, and in swamps; and they indicate that many of the species attained a huge size—thus the tibia of Dinornis giganteus measures about a yard in length, and the bird itself must have stood 10 or 11 feet high. Another species, Dinornus elephantopus, although less in height, possessed, according to Professor Owen, the most massive skeleton in the entire order of birds, its toe bones almost rivaling those of the elephant. Wing bones are believed to have been entirely wanting in those species which now constitute the genus Dinornus, as also the fourth toe, which is present along with rudimentary wing bones in the species which have been placed in the new genus Palaeopteryx. Among living birds Dinornus agrees most closely with the Apteryx, the dimunitive living representative in New Zealand of this gigantic race of birds, while somewhat resembling the emus and cassowary in the formation of
the feathers. Judging from their general structure, and from the habits of their nearest living allies, these great wingless birds may be supposed to have inhabited the plains and hillsides rather than the forests of New Zealand, and to have been omnivorous, feeding indiscriminately on seeds and roots, lizards, ants, and insects. Crop-chisels are often found in little heaps beside their skeletons, and as these are generally such stumps as occur in the neighbourhood, it has been inferred that the Dinornis was comparatively stationary in its habits. New Zealand has been so thoroughly explored in recent years as to render it highly improbable that the moa, as the Dinornis is called by the Maoris, will yet be found alive, but there seems sufficient reason for believing that its final extinction may have taken place since the arrival of the Maori race in New Zealand. The Maoris have only been settled there for about five centuries, yet they have traditions regarding moa hunting, its bones are found in ancient cooking ovens, and many specimens have been recognized by the church as duly existing in the hands of a human skeleton. There is evidence of the coexistence in New Zealand of about 20 species of moas during post-Pliocene times, and this, as A. R. Wallace remarks, points to the conclusion that New Zealand was at one time a much more extensive land than it now is; while the fact, that recently remains of the Dinornis have been found in a post-Pliocene deposit in Queensland strengthens the supposition that when the moa flourished the lower jaw was bent downwards and bearing two tusks, like the Dinotherium among proboscidean mammals; De Blainville, on the other hand, regarded it as an aquatic animal, destitute of legs, and somewhat resembling the manta. Its reversed tusks having probably been used to moor the creature to the bank of the streams it frequented, of to assist it in leaving the water. The recent discovery, however, of limb bones, decidedly proboscidean in type, and supposed to belong to the Dinotherium, supports the view that these creatures were more akin to the elephant than to the moa.

DINOTHERIUM, an extinct mammal, fossil remains of which occur in the Miocene beds of France, Germany, Greece, and Northern India. These until lately consisted exclusively of teeth and the bones of the head. An entire skull, obtained from the Eppelsheim beds of Hessia Darmstadt in 1836, measured 4½ feet in length and 3 feet in breadth, and thus indicated an animal exceeding the elephant in size. Its upper jaw was destitute of incisor and canine teeth, but possessed 8 molars on each side, with a corresponding number in the jaw beneath. Its most remarkable feature, however, consisted in the front part of the lower jaw being bent downwards and bearing two tusk-like incisors also directed downwards and backwards. Judging from these remains Professor Owen placed the Dinotherium among the proboscidæan mammals; De Blainville, on the other hand, regarded it as an aquatic animal, destitute of legs, and somewhat resembling the manta. Its reversed tusks having probably been used to moor the creature to the bank of the streams it frequented, of to assist it in leaving the water. The recent discovery, however, of limb bones, decidedly proboscidean in type, and supposed to belong to the Dinotherium, supports the view that these creatures were more akin to the elephant than to the moa.

DIOCESE, from the Greek διοίκησις—primarily meaning administration, then the territorial circumscription in which administration was exercised—was first used to denote the Greek provinces of the Roman empire, or more properly the portion of a province ruled by a procurator. Thus Cicero had, besides Calicus, three "dioceses" in Asia. Bingham (lib. ix. c. 1) says that the division of the empire into clerical dioceses was in the time of Constantine, whereas the division into provinces was 'much anterior. He goes on to show that the primitive church followed exactly the example of the empire in her territorial arrangements. As in every metropolis of each province there was a magistrate with authority over the magistrates of each city, so in every metropolis there was a bishop, whose authority extended over the entire province, who was thence called "metropolitan," or "primate," as being the first or principal bishop of the province. And everywhere the episcopal sees were under the authority of the bishop of the civil metropolis, except in Africa, where the primac" was usually the senior bishop of the province. The term "diocese," however, was sometimes used in the more comprehensive, and the term province in the less comprehensive sense, as appears from the Notitia dignitatum Imperii, drawn up, as it would seem, in the time of the emperors Arcadius and Honorius (see Bingham, loc. cit.) The territorial division, however, as given in the Notitia, was purely civil. But Bingham tells us that, though we have no equally ancient account of the ecclesiastical division of the empire, yet if we compare the fragmentary bits of information which may be picked out of the acts of subscriptions to the earlier councils with later notices, it will be seen that the ecclesiastical very exactly followed the civil distribution.

It may be mentioned that, before the 4th century, the term "parish"—ἐπαρχία—was often used indiscriminately with the word "diocese," a circumstance which has caused ecclesiastical antiquarians to expend much erudition in showing that, despite the confusion of terms, the thing intended was to give us an idea of a diocese, and not to our idea of a parish.

The uncertainty with regard to the number and circumscription of the English ecclesiastical dioceses under the Romans is great, and the information attainable fragmentary. At the council of Arles, held in the year 314, the bishop of York, the bishop of London, and the bishop "de colonia Lindi," probably Lincoln, are recorded to have been present. But the changes in the number and territorial circumscription following the Saxon invasion—and not yet finally completed—were so great that volumes of minute antiquarian investigation would be needed to trace—in so far as it may be still possible to trace—the progress of nomenclature and delimitation of the various dioceses of Britain from the first establishment of them to the present day.

The division of dioceses found to be too large to be conveniently administered by one bishop was practised from very early times, as may be seen by the decree of a council in Portugal about the middle of the 6th century. Another reason for dividing a diocese, and establishing a new see, has been recognized by the church as duly existing "if the sovereign should think fit to endow some principal village or town with the rank and privileges of a city" (Bingham, lib. xvii. c. 5). But there are canons for the punishment of such as might unduly the sovereign so to erect any town into a city, solely with the view of becoming bishop thereof. Nor could any diocese be divided without the consent of the primate.

In the countries more immediately subjected to the Roman pontiff the multiplication of dioceses has been decisive, the number of them in the apostolic dominions being no less than 68, while the Roman Church reckons in the whole of Europe (exclusive of the English, but inclusive of the Irish sees) 578 sees.

DIOCLETIAN. Valerius DIOCLETIANUS (245-313), Roman emperor, was born of obscure parents near Salona, in Dalmatia, and reigned from 284 to 305 A.D. He entered the army and served with high distinction, held important commands under the emperors Probus and Aurelian, and accompanied Carus to the Persian war. After the death of Numerianus he was chosen emperor by the troops at Chalcedon, and slew with his own hands Aurus Aper, the prefect of the praetorian. His advent to the throne marks the commencement of the era of Diocletian, August 29, 284. Having been installed at
Nicodemia, he received general acknowledgment after the murder of Catus. He appointed Maximian Augustus in 286, and Constantius Chlorus and Galerius, Caesars in 292. Each of the four rulers was placed at a separate capital—Treves, Sirmium, Milan, Nicodemia. This amounted to an entirely new organization of the empire. Thus commenced a plan commensurate with the work of government which it now had to effect. At the age of fifty-nine, exhausted with labour, he abdicated his sovereignty on May 1, 305, and retired to Salona, the place of his birth, where he died eight years afterwards. His reign was memorable for the persecution of the Christians.

Diodati, Giovanni (1576-1649), a Swiss theologian of the Reformed Church, was born at Geneva on the 7th June 1679 of a noble family originally belonging to Lucca, which had been expatriated for the profession of Protestantism. In his youth he distinguished himself as a biblical scholar, and at the age of twenty-one he was nominated Professor of Hebrew at Geneva on the recommendation of Beza. In 1608 he became a pastor, or parson, at Geneva, and in the following year he succeeded Beza as a professor of theology. As a preacher he was eloquent, bold, and fearless, with his full share of the intolerance that prevailed among his party at Geneva. He held a high place among the reformers of Geneva, by whom he was sent on a mission to France in 1614. He had previously visited Italy, and made the acquaintance of Sarpi and Fulgenzio, whom he endeavoured unsuccessfully to engage in a reformation movement. In 1618-19 he attended the Synod of Dort, and took a prominent part in its deliberations, being one of the six divines appointed to draw up the account of its proceedings. He was a thorough Calvinist, and entirely sympathized with the condemnation of the Arminians. In 1645 he resigned his professorship, and he died at Geneva on the 3d October 1649. Diodati is chiefly celebrated as the author of the translation of the Bible into Italian, which appeared in 1607. Another edition with notes was issued in 1607. As a translator he possessed the primary qualification of a competent knowledge of the original, but his work was rather a paraphrase than a translation, and his notes were those of a theologian rather than of a critic. He also undertook the translation of the Bible into French, which appeared with notes in 1614. Among his other works were his Annotationes in Biblia (1607), of which an English translation was published in London in 1648, and various polemical treatises, such as De fiduci Pontificum Purgatorum, 1619; De rusta Sacrorum Reformatorum et Ecclesiae Romanae, 1629; De Antichristo, &c., He also published French translations of Sarpi's History of the Council of Trent, and of Edwin Sandys's Account of the State of Religion in the West.

Diodorus, named Siculus, a Greek historian, born at Athens in Sicily. Of his life we know nothing except what he himself has narrated, that, in prosecution of his historical researches, he undertook frequent and dangerous journeys, and studied Latin at Rome. His history occupied thirty years in writing, and was at last completed in forty books. From infancy till the age of forty he was a student of philosophy. He was born at Corinth. In the death of Julius Caesar; but the passages which show him to have survived the alteration of the calendar by Augustus are generally regarded as apocryphal. His history, to which, from its comprehensive plan, he has given the title of Bibliotheca, is divided into three parts. The first comprises the history of the non-Hellenic, and afterwards of the Hellenic tribes, the second section ends with Alexander's death; and the third continues the history as far as the beginning of Caesar's Gallic War. Of this extensive work there are still extant only the first five books, treating of the mythical history of the Egyptians, Assyrians, Ethiopians, and Greeks; and also from the 11th to the 20th book inclusive, beginning with the second Persan war, and ending with the history of the successors of Alexander, previously to the partition of the Macedonian empire. The rest exists only in fragments which have been collected by Phoebus. The faults of Diodorus are principally from the gigantic nature of the undertaking, the cumbersome nature of the materials, and the awkward form of annals into which he has thrown his narrative. He has been at little pains to sit his materials, and hence frequent repetitions and contradictions may be found in the body of the work. As a critic, he seems to have been altogether ignorant of the ethical advantages of history, and shrinks from unmanusing praise or blame to the persons whose history he writes.


Diogenes, of Apollonia in Cilicia, was a celebrated natural philosopher who flourished at Athens about 460 B.C. He was a pupil of Anaximenes and a contemporary of Anaxagoras. The fragments of his writings have been collected together by Panzerbieter. He believed the air to be the source of all being, and all other substances to be derived from it by condensation and rarefaction. His chief advance upon the doctrines of his master is that he asserted air, the primal force, to be intelligence—'the air which stirred within him not only prompted but instructed. The air as the origin of all things is necessarily an eternal, imperishable substance, but as soul it is also necessarily endowed with consciousness.' Mr Lewes and Mr Groce assign to him a higher place in the evolution of philosophy than either Hegel or Schwegler.

Diogenes (about 412-233 B.C), the famous Cynic philosopher, was the son of Icosias, a money-changer of Goose in Pontus. Having been detected in adulterating coin, his father and he were compelled to leave their native city. According to another account, however, Icosias died in prison, and Diogenes fled to Athens with a single attendant. On his arrival in that city he dismissed his attendant with the piquant question, "If Manes could live without Diogenes, why not Diogenes without him?" and on the same principle he denied himself of all superfluous dress, furniture, and even ideas. A wooden bowl, which, with his cloak and wallet, formed his only movable, is said to have been immediately discarded when he saw a boy drinking water from the hollow of his hand. The fame of Antisthenes soon attracted him to Cynoarges, and the pertinacity with which, for the sake of wisdom, he not only endured the scoffs but volunteered to submit to the blows of the great teacher, soon procured him a favourable reception from the whole Cynical school. His favourite pupil, however, soon outran his master in the extravagancies of his life, and the pungent keenness of his sarcasms. That he took up his abode in a dock belonging to the temple of Cybele is a circumstance little to suspicion, from being more frequently alluded to by the satirists than by the biographers of Diogenes. That he
used to imbue himself to the vicissitudes of the weather by
rolling himself in hot sand in summer, and in winter by
embracing statues covered with snow, are facts resting on
the authority of all the ancient historians. His numerous
witty apophthegms are preserved by Diogenes Laertius.
After his voyage to Aegina, during which he fell into the
hands of pirates, who sold him as a slave in Crete, the
conduct of Diogenes appears in a much less ridiculous
light. With characteristic boldness he proclaimed to his
captors that he knew no trade except "to govern men," and
wished to be sold "to a man that wanted a master." Such a
 purchaser he seems to have found in Xenocrates, who
took him to Corinth to superintend the education of his
children. There he spent the rest of his life; and he is said
to have reached an extreme old age. There at the Isthmian
games he taught the assembled concourse in the Kranion;
and thither he attracted a crowd of disciples when
Antisthenes had ceased to sickle their ears in Cynosarges.
The latter, too, in all probability, his famous interview with
Alexander took place, in which the only favour he had to
begg of the prince was that he would not stand between him
and the sun,—when Alexander is said to have exclaimed,
"If I were not Alexander, I would be Diogenes." To
Athens Diogenes seems never to have returned. Of his
death, which is said to have taken place about the same
moment with that of Alexander the Great, there are various
conflicting accounts. That he perished by the bite of a dog,
or from the immoderate use of raw flesh, or by his own
hand, is generally disbelieved. It is more probable
that his death was calm and peaceful; and in spite of his
desire to be thrown to the beasts of the field, he received
from Xenocrates an honourable interment. In the days of
Pausanias the Corinthians pointed with pride to his grave;
and on the Isthmus there was a pillar erected to
his memory, on which,

ends with Epicurus. The Socratic school, with its various
branches, is classed with the Ionic; while the Eleatics and
sceptics are treated under the Italic. The whole of
the last book is devoted to Epicurus. From the statements
of Bulleus, the text of Laertius seems to have been much
 fuller than that which now possesses; and hence it have been entertained of obtaining a more complete copy.


DIO-MEDES, son of the impetuous Tydeus, is a hero of
the Eolian and Argo-Tbeban legends. He is in the Iliad
the leader of the tribes which belong to the government
of the Amykhoudes. A favourite of Athena, from whom he
received the gift of immortality, he does not spare even
gods if she is standing by his side. He carried off the
Troyan Palladium and brought it to Argos, where it was
preserved by his descendants. He was known in many
other places as a devotee of Athena and a supporter of her
worship. In Argos his shield was carried through the
town as a relic on the festival of Athens. A temple of
Athena Anemotus (the storm ruler) was said to have been
founded by him. He was worshipped in several parts of
Italy, and in Salamis in Cyprus. Indeed he may be said
generally to belong to the worship of Athena in so far as she
was the goddess of storms and war.

DION, of Syracuse (408-355 B.C.), was the son of
Hipparinus, and brother-in-law of Dionysus the Elder.
In his youth he was an ardent admirer and diligent pupil
of Plato, whom Dionysus had invited to Syracuse; and
he used every effort to promote the carrying out of his master's
maxims in the administration of the kingdom. His near
relationship to the despot gave him great influence at court,
and also enabled him to amass considerable wealth.
Accordingly, on the accession of the younger Dionysus,
the stern morality of the philosopher stood in marked con-
trast to the dissolute character of the prince. An
antagonism thus swiftly sprang up between the two; and
the proposal of Dion to invite Plato again to Syracuse was
made the occasion of an open rupture. To counteract
the influence of that distinguished philosopher, the enemies of
Dion obtained the recall of the historian Philistus, who
had already signaled himself as a faithful supporter of
despotic power. This artful courtier quickly regained his
favor, and influence over the mind of Dionysus, and was at length
successful in procuring the banishment of Dion. The
exiled philosopher returned to Athens, where he was at first
permitted to enjoy his revenues in peace; but the intercess-
ions of Plato served to exasperate the tyrant, and at length
provoked him to confiscate the property of Dion, and give
his wife to another. This last outrage roused Dion to seek
the liberation of his country by force of arms. Assembling
a small force at Zacynthus, he sailed to Sicily, and, in the
absence of Dionysus, was received with demonstrations of
joy. He succeeded in defeating the forces of the tyrant,
but was himself soon after supplanted by the intrigues of
Herschedes. Again he was banished; but the incompetency
of the new leader soon led to his recall. He had, however,
scarcely made himself master of Sicily when the people
began to express their discontent with his tyrannical con-
duct, and he was assassinated by Caliphus, an Athenian
who had accompanied him in his expedition.

DION CASSIUS COCEIANUS, the celebrated his-
torian of Rome, was born at Nicaea in Bithynia, 155 a.D.
His father's name was Cassius Apronianus, and by his
mother's side he was the grandson of Dion Chrysostom,
who also obtained the surname of Cocceianus. When a
young man he accompanied his father to Cilicia, of which
he had the administration; and on his father's death
he went to Rome, where in the last year of the reign
of Marcus Aurelius, or immediately after the death of that
emperor, he was received into the senate. During the
reign of Commodus, Dion continued to practise as an
advocate at the Roman bar, and held the offices of adile
and quaestor. He was raised to the prætorship by Fertunus,
but did not assume office till the reign of Septimius
Severus, with whom he was for a long time on the most
intimate footing. By Marcinus he was intrusted with the
administration of Pergamus and Smyrna, and on his return
to Rome he was raised to the consulship about 220. After
this he obtained the proconsulship of Africa, and
again on his return was sent as legate successively to
dalmasia and Pannonia. He was raised a second time to
the consulate by Alexander Severus, in 229; but under
pretext of suffering from a diseased foot, he soon after
retired to Neuss, where he died. The date of his death is
unknown. Previous to writing his history Dion Cassius
had inscribed to the Emperor Severus an account of various
dreams and prodigies which had presaged his elevation to
the throne, and had also written a biography of the Emperor
Commodus, which was afterwards incorporated into his
larger work. The history of Rome, which consisted of 59
books,—and, after the example of Livy, was divided into
decades,—began with the landing of Agneas in Italy, and
continued as far as the opening of the reign of Alexander
Severus. The first 24 books exist only in fragments,
from the 36th to the 54th, the work is extant complete,
from the 65th to the 60th, it is probably an abridgment,
and besides these, parts of the 71st and 75th books have
also been recovered. The diligence of Dion as an historian
is undoubted, and the various important offices which he
held under the emperors gave him valuable opportunities
for historical investigation. Although more philosophical
than the compilations of the more annalist, his work is not
remarkable for vigour of judgment or critical acumen. His
style is far clearer than that of Thucydides, whom he took
as his model, but his diction is full of Latinity.

His history was first published in a Latin translation by N.
Laestacensce, Verona, 1526. The best modern edition is that
of Sturz, Leopac, 1824-43, which contains the Excerpta
Valentana various other writings, such as a History of Persia, India or India
wars, a Life of Arrmua, Greece, and a work on the Emperor Trajan,
are attributed to Dion Cassius, but in all probability without founda-
tion. The substance of his history is reproduced in the annals of Zoasias

DION CHRYSTOSM (a c., golden mouthed), (c. 50-
117), was born at Prusa, in Bithynia, about the middle of
the 1st century. He visited Egypt with his father at an
early period of his life, and went to Rome during the reign of
Domitian. Being implicated in a plot against the tyran
Dion fled from the capital, and wandered about in Thrace,
Myan, Scythia, and the other countries of the Gete, with
only Plato's Phaido and Demosthenes On the Embassy
in his possession, till the accession of Nerva, when he
was allowed to return. With Nerva and Trajan he
continued on the most friendly footing. He returned to
Rome for a short time, but having been accused of
peculation and treason, he returned to Rome, where he re-
mained till his death. Eighty orations of his are extant
entire, and there are fragments of about fifteen others.
They are written in a local and elegant style, and treat
mostly of political, ethical, and mythological subjects.

DIONYSIA, or BACCHANALIA, were festivals in honour of
Dionysus (q. v.) generally, but in particular the term refers
to the festivals celebrated in Attica and by the branches of the Attic Ionian
race in the islands and in Asia Minor. In Attica there were two festivals annually. (1) The lesser
Dionysia, or vs er Νυσίαν, were held in the country places
where the vine was grown in the month of December.
This was a vintage festival, and was accompanied by songs,
dances, phallic processions, and the impromptu performances of itinerant players, who with others from the city thronged
to take part in the excitement of the rustic sports. (2) The
greater Dionysia, or γά λέρην, were held in the city
of Athens in the month of March. This was a festival of
joy at the departure of winter and the promise of summer,
Dionysus being regarded as having delivered the people
from the wants and troubles of winter. The religious
rites of the festival was the conveying of the ancient image
of the god, which had been brought from Eleutheria to
Athens, from the ancient sanctuary of the Lenens to
another sanctuary, with a chorus of boys and a procession
carrying masks and singing the dieu-rhambus. The cul-
mination of the festival was in the production of tragedies,
comedies, and satyr dramas in the great theatre of
Dionysus. Besides the Dionysia strictly so called, there
were also the Lenens and Anthesteria, both held in honour
of this god, the former in January and the latter in
February.

DIONYSIUS, the Elder (c. 430-367 B.C.), tyrant of
Syracuse, was born about 430 B.C. He began life as a
clerk in a public office, and first took part in political
affairs during the discussions that followed the destruction
of the Athenian expedition. He was wounded in the
attempt of Hermocrates to seize upon Syracuse, and,
during the disasters inflicted by the Carthaginians who had
invaded the island, he succeeded, along with Philius and
Hipparrhon, in procuring the deposition of the Sicilian
generals, and was himself included in the number appointed
in their stead. By intriguing with the inhabitants of Gela,
which he had been sent to relieve, and spreading imma-
ensions of treachery in regard to his colleagues, he was
ultimately invested with the supreme command, and by
the help of a large body-guard he soon made himself
independent of the popular opinion. Posthum having
thunned the Carthaginian army, Dionysius, in spite of his
ill success, found no difficulty in procuring peace (405 B.C.).

In the stronghold of Ortgia he defied the machinations
of his enemies, until, partly from defeats and partly from
dissensions, the opposition died away. After a successful
expedition against Naxos, Catana, and Leontini, his
efforts were directed against Carthage. (See Carthage)

He also earned an expedition against Rhegium and its
allied cities in Magna Graecia. In one campaign, in which
he was joined by the Lucanians, he devastated the territories
of Thurii, Croton, and Locri. After a protracted
sige he took Rhegium, 327 B.C., and sold the inhabitants
as slaves. He joined the Illyrians in an unsuccessful
attempt to plunder the temple of Delphi, and also joined
the temple of Ceres in the Egyptian coast. In the
Peloponnesian war he espoused the side of the Spartans.
Not content with his military renown, Dionysius aspired
also to poetical glory. His poems were lauded at the
Olympic games; but having gained a prize for tragic
poetry at Athens, he was so elated that he engaged in a
debate which proved fatal (367 B.C.). His life was
written by Philistus, but the work has unfortunately perished.

DIONYSIUS, the Younger, ascended the throne of Syra-
cuse at his father's death, in 367 B.C. He was driven
from the kingdom by Dion, and fled to Locri; but during
the coumotions which followed the assassination of
that leader, he managed to make himself master of Syracuse.
On the arrival of Timoleon he was compelled to surrender
and retire to Corinth (343 B.C.), where he spent the rest of
his days in poverty.

DIONYSIUS, of Halicarnassus, was born about the
middle of the first century B.C. His father's name was
Alexander. From the introduction to his great work we
learn that he went to Italy after the termination of the
civil war, and spent twenty-two years in preparing
materials for his history, which is entitled Archakeo
mene, and embraced the history of Rome from the mythical period
used to immerse himself to the vicissitudes of the weather by
rolling himself in hot sand in summer, and in winter by
embracing statues covered with snow, are facts resting on
the authority of all the ancient historians. His numerous
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to have reached an extreme old age. There at the Isthmian
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and thither he attracted a crowd of disciples when
Antisthenes had ceased to tackle their ears in Cynosarges.

Of that of Alexander the Great, there are
conflicting accounts. That he perished by the bite of a dog,
and on the isthmus there was a pillar elected to
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been entertained of obtaining a more complete copy.

The best modern edition is that of Hubner, Lex. g. 8vo,
1828-31.

DIOGENES LAERTIUS, the biographer of the Greek
philosophers, is supposed by some to have received his
surname from the town of Laertes in Cilicia, and by others
from the Roman family of the Laertii. Of the circum-
stances of his life we know nothing. The date at which he
wrote, in all probability, his famous interview with
Alexander took place, in which the only favour he had to
beg of the prince was that he would not stand between him
and the sun,—when Alexander is said to have exclaimed,
"If I were not Alexander, I would be Diogenes." To
Athens Diogenes seems never to have returned. Of his
death, which is said to have taken place with that of
Alexander the Great, there are various conflicting
accounts. That he perished by the bite of a dog,
or from the immoderate use of raw flesh, or by his own
hand, is generally disbelieved. It is more probable
that his death was calm and peaceful; and in spite of his
death he is still regarded as a Christian; but it seems more probable that he was an
Epicurean. The work by which he is known professes to
give an account of the lives and sayings of the Greek
philosophers. Although it is at best an uncritical and
unphilosophical compilation, its value, as giving us an
insight into the private life of the Greek sages, justly led
Montaigne to exclaim that he wished that instead of one
Laertius there had been a dozen. In the commencement
of the work he divides philosophers into the Ionic and
Halic schools. The biographies of the former begin with
Anaximander, and end with Chrysippus, Theophrastus,
and Chrysippus; the latter begins with Pythagoras, and
ends with Epicurus.
emperor, he was received into the senate. During the reign of Commodus, Dion continued to practise as an advocate at the Roman bar, and held the offices of adile and quaestor. He was raised to the praetorship by Pertinax, but did not assume office till the reign of Septimius Severus, with whom he was for a long time on the most intimate footing. By Macrinus he was intrusted with the administration of Pergamus and Smyrna, and on his return to Rome he was raised to the consulship about 220. After this he obtained the procuratorship of Africa, and again on his return was sent as legate successively to Dalmatia and Pannonia. He was raised a second time to the consulship by Alexander Severus, in 229, but under protest of suffering from a diseased foot, he soon after retired to Nicæa, where he died. The date of his death is unknown.

Previous to writing his history Dion Cassius had inscribed to the Emperor Severus an account of various dreams and prodigies which had presaged his elevation to the throne, and had also written a biography of the Emperor Commodus, which was afterwards incorporated into his larger work. The history of Rome, which consisted of 20 books,—and, after the example of Livy, was divided into decades,—began with the landing of Æneas in Italy, and was continued as far as the opening of the reign of Alexander Severus. The first 24 books exist only in fragments; from the 36th to the 54th, the work is extant complete, from the 55th to the 60th, it is probably an abridgment, and besides these, parts of the 71st and 75th books have also been recovered. The diligence of Dion as an historian is undoubted, and the various important offices which he held under the emperors gave him valuable opportunities for historical investigation. Although more philological than the compilations of the mere annalist, his work is not remarkable for vigour of judgment or critical acumen. His style is far clearer than that of Thucydides, whom he took as his model; but his diction is full of Latinity.

His history was first published in a Latin translation by N. Lenzoni, Venice, 1526. The best modern edition is that of Sturt, London, 1824-43, which contains the Excerpta Vatiana. Various other writings, such as a History of Persia, Ensayos or Essays, and a Life of Arruntus, Gallicus, and a work on the Emperor Trajan, are attributed to Dion Cassius, but in all probability without foundation. The substance of his history is reproduced in the annals of Zonaras.

DION CHrysostom (σ. c., golden mouthed), (c. 50-117), was born at Prusa, in Bithynia, about the middle of the 1st century. He visited Egypt with his father at an early period of his life, and went to Rome during the reign of Domitian. Being implicated in a plot against the tyrant, Dion fled from the capital, and wandered about in Thrace, Myisia, Scythia, and the other countries of the Geta, with only Plato's Phædo and Demosthenes On the Embassy in his possession, till the accession of Nerva, when he was allowed to return. With Nerva and Trajan he continued on the most friendly footing. Retired to Prusa for a short time; but having been accused of peculation and treason, he returned to Rome, where he remained till his death. Eighty orations of his are extant entire, and there are fragments of about fifteen others. They are written in a local and elegant style, and treat mostly of political, ethical, and mythological subjects.

DIONYSIA, or Bacchanalia, were festivals in honour of Dionysus (γ.) generally, but in particular the term refers to the festivals celebrated in Attica and by the branches of the Attic-Ionic race in the islands and in Asin Minor. In Attica there were two festivals annually. (1) The Great Dionysia, or θυ σετε, were held in the country places where the vine was grown in the month of December. This was a vintage festival, and was accompanied by songs, dance, phallic processions, and the impromptu performances of itinerant players, who with others from the city thronged to take part in the excitement of the rustic sports. (2) The greater Dionysia, or θυ τω λωρε, were held in the city of Athens in the month of March. This was a festival at the departure of winter and the promise of summer; Dionysus being regarded as having delivered the people from the wants and troubles of winter. The religious act of the festival was the conveyance of the ancient image of the god, which had been brought from Eleutherus to Athens, from the ancient sanctuary of the Lemeon to another sanctuary, with a chorus of boys and a procession carrying masks and singing the dithyrambus. The culminating of the festival was in the production of tragedies, comedies, and satyr dramas in the great theatre of Dionysus. Besides the Dionysia strictly so called, there were also the Lemones and Antistria, both held in honour of this god, the former in January and the latter in February.

DIONYSIUS, the Elder (c. 450-367 B.C.), tyrant of Syracuse, was born about 450 B.C. He began life as a clerk in a public office, and first took part in political affairs during the discussions that followed the destruction of the Athenian expedition. He was wounded in the attempt of Hermocrates to seize upon Syracuse, and, during the disasters inflicted by the Carthaginians who had invaded the island, he succeeded, along with Philistus and Hipparchus, in procuring the defection of the Sicilian generals, and was himself included in the number appointed in their stead. By intriguing with the inhabitants of Gela, which he had been sent to relieve, and spreading insinuations of treachery in regard to his colleagues, he was ultimately invested with the supreme command, and by the help of a large body-guard he soon made himself independent of the popular opinion. Pestilence having thinned the Carthaginian army, Dionysius, in spite of his ill success, found no difficulty in procuring peace (405 B.C.) In the stronghold of Orthya he defied the machinations of his enemies, until, partly from defects and partly from dissensions, the opposition died away. After a successful expedition against Naxos, Catana, and Leontini, his efforts were directed against Carthage (See Carthage). He also carried an expedition against Rhegium and its allied cities in Magna Graecia. In one campaign, in which he was joined by the Lucanians, he devastated the territories of Thurii, Croton, and Locri. After a protracted siege he took Rhegium, 387 B.C., and sold the inhabitants as slaves. He joined the Illyrians in an unsuccessful attempt to plunder the temple of Delphi, and also pilaged the temple of Ceres at Corinth. On the Peloponnesian war he espoused the side of the Spartans. Not content with his military renown, Dionysius aspired also to poetical glory. His poems were praised at the Olympic games; but having gained a prize for tragic poetry at Athens, he was so elated that he engaged in a debauch which proved fatal (367 B.C.). His life was written by Philistus, but the work has unfortunately perished.

DIONYSIUS, the Younger, ascended the throne of Syracuse at his father's death, in 367 B.C. He was driven from the kingdom by Dion, and fled to Locri, but during the cominations which followed the assassination of that leader, he managed to make himself master of Syracuse. On the arrival of Timoleon he was compelled to surrender and retire to Corinth (343 B.C.), where he spent the rest of his days in poverty.

DIONYSIUS, of Halicarnassus, was born about the middle of the first century B.C. His father's name was Alexander. From the introduction to his great work we learn that he went to Italy after the termination of the civil wars, and spent twenty-two years in preparing materials for his history, which is entitled Aeneidomachia, and embraced the history of Rome from the mythical period.
to the beginning of the first Punic war. It was divided into twenty books,—of which the first nine remain entire, and the remaining books only exist in fragments. In the first three books of Appian, and in the Camillus of Plutarch, much of Dionysius has undoubtedly been embodied. As an historian he is minute and painstaking; but his attempts to Greco-romanize the history of Rome, that the Greeks ought in some measure to be reconciled to a foreign yoke, render his accuracy more than suspicious. Dionysius was also the author of a treatise on rhetoric, which, with his criticism on Thucydides, Lysias, Isocrates, Iasius, Dinarchus, Plato, and Demosthenes, have been preserved. The best editions of his works are those of Hudson and Reiske. The rhetorical works have been edited separately, by Gros and by Westermann.

DIONYSIUS, the Areopagite, according to Suidas, was an Athenian by birth, and eminent for his literary attainments. He studied first at Athens, and afterwards at Alexandria in Egypt. While in the latter city, he beheld that remarkable eclipse of the sun, as he terms it, which took place at the death of Christ, and exclaimed to his friend Apollonii, ή λυθη εκεινον την ήμεραν, ή την παραγωγην συναστικην, Either the Divinity suffers, or sympathizes with some sufferer.' He further details that, after Dionysius returned to Athens, he was admitted into the Areopagus, and, having embraced Christianity about 50 A.D., was constituted bishop of Athens by the apostle Paul (Acts xxvi. 34). Aristides, an Athenian philosopher, asserts that he suffered martyrdom—a fact generally admitted by historians; but the precise period of his death, whether under Domitian, Trajan, or Adrian, is not certain. A writer in later times attempted to personate the Areopagite, and continued to pass his productions on the Christian world as of the apostolic age, thereby greatly influencing the spirit of both the Eastern and Western Churches. These writings consist of a book called The Celestial Hierarchy, another Of the Ecclesiastical Hierarchy; A Treatise on the Divine Names; another Of Mystical Divinity; and Ten Epistles. Different opinions have been held as to the real author of these productions. They were ascribed, at an early period, to Apollinaris, bishop of Laodicea, in the 4th century. The resemblance between the Areopagita and the writings of Proclus and Plutinus is so great that it is probable the Pseudo-Dionysius did not write much earlier than the 5th century. The first uncontroverted occasion on which these supposititious writings are referred to, is in the conference between the Severians (a sect of Eutychians) and the Catholics, held in the emperor Justinian's palace, 532 A.D., in which they are quoted by the heretical party.

DIONYSIUS, surnamed Pseudoergastus, from his being the author of πραγματευματα της γης, containing a description of the whole earth in hexameter verse, and written in a terse and elegant style. This work enjoyed a high degree of popularity in ancient times, and two translations or paraphrases of it were made by the Romans, one by Rufus Festus Avienus, and the other by the grammarian Priscian. The best edition of the original is that by Bernhardy (Leipsic, 1638). Great differences of opinion have been entertained as to the age and country of this Dionysus. All, however, are agreed in placing him in the time of the Roman emperors, and it seems highly probable that he flourished in the latter part of the 3d or the beginning of the 4th century. Eustathius says that he was by descent a Lybian.

DIONYSIUS EXIGIUS, one of the most learned men of the 6th century, and especially distinguished as a chronologist, was, according to the statement of his friend Cassiodorus, a Scythian by birth, Scytha natione. This may mean only that he was a native of the region bordering on the Black Sea, and does not necessarily imply that he was not of Greek origin. Such origin is indicated by his name and by his thorough familiarity with the Greek language. His surname "Exigius" is usually translated "the Little," and is supposed to refer to his stature; but it appears to be at least as probable that his known humility led him to assume the designation. He was living at Rome in the first half of the 6th century, and is usually spoken of as abbot of a Roman monastery. Cassiodorus, however, calls him simply "monk," while Bede calls him "abbot." But as it was not unusual to apply the latter term to distinguished monks who were not heads of their houses, it is uncertain whether Dionysius was abbot in fact or only by courtesy. He was in high repute as a learned theologian, was profoundly versed in the Holy Scriptures and in canon law, and was also an accomplished mathematician and astronomer. We owe to him a collection of ecclesiastical canons, comprising the apostolic canons and the decrees of the councils of Nicaea, Constantinople, Chalcedon, and Sardis, and also a collection of the decreetals of the Roman pontiffs from Sincerus to Anastasius II. These collections were published by Justel in 1628. Dionysius did good service to his contemporaries by his translations of many Greek works into Latin; and by these translations some works, the originals of which have perished, have been handed down to us. His name, however, is now perhaps chiefly remembered for his chronological labours. It was Dionysius who introduced the method of reckoning the Christian era which we now use. (See CHRONOLOGY.) His friend Cassiodorus depicts in glowing terms the character of Dionysius as a learned ascetic, and praises his wisdom and simplicity, his accomplishments and his lowly-mindedness, his power of eloquent speech and his capacity for silence. He died at Rome, probably about the year 545.

DIONYSUS, in Greek Mythology, is principally the god of the vine; and in the myths concerning him it is clear that the effects of wine and the spread of vine growing have both been kept in view. No sooner had the god grown up than he started on distant expeditions to teach men to cultivate the vine, and on these occasions his followers were known for their ecstatic ceremonies. It would seem also as if the story of his birth was only a representation of the growth and ripening of the grape. Thebes in Boeotia was originally the local centre of his worship in Greece; and he was a son of Semele, a daughter of Cadmus, the king of Thebes, his father being Zeus, who among other divine functions exercised also that of god of the fertilizing spring showers. Before the child was mature, Zeus appeared to Semele at her request in his majesty as god of lightning, by which she was killed, but the infant was saved from the same fate by cool ivy which grew up suddenly around him. Zeus took him up, enclosed him within his own thigh till he came to maturity, and then brought him to the light, so that he was twice born; and it was to conform to this birth that the dithyrambus was sung. He was now conveyed by Hermes to be brought up by the nymphs of Nysa, from which place it is probably his name Dyo-nyus, or "god of Nysa," is derived; but among the many places of this name claiming to have been the true one it is impossible to decide. In his journeys to teach the cultivation of the vine he met with opposition in some cases, as in that of Lycurgus, a Thracian king, from whose attack Dionysus saved himself by leaping into the sea, where he was kindly received by Thetis. Lycurgus was blinded by Zeus and soon died, or, according to another story, became frantic and hewed down his own son, mistaking him for a vine, while in a third story Ambroseos, who was changed
into a vine, clung so closely round him that, failing to escape, he died. A similar incident is that of Pentheus, king of Thebes, who opposed the orgastic ceremonies introduced by Dionysus among the women of Thebes, and, having been present watching one of these ceremonies, was mistaken for some annual of the chase, pursued, and slain by his own mother. At Orchomenus, the three daughters of Minyas refused to join the other women in the orgiastic orgies, and for this were transformed into birds. It was in accordance with this tradition that in after times, at the festival of the Agrigentia, the priests of Dionysus pursued the women of the race of Minyas with drawn swords, and if they captured them, killed them, which incident, it will be seen, also justifies the title of ἑπνοίας applied to Dionysus. On the other hand, when the god was received hospitably he repaid the kindness by the gift of the vine, and of this the chief instance is that of Ieraco of Attica, who lived in the time of King Pandion. But Ieraco, instead of keeping secret the use of the vine, spread it among the herdsman and labourers, who, becoming intoxicated with the wine, siew him and threw him into a well or buried him under a tree, where his daughter Ergone found his grave, and in her despair hanged herself on the tree. In recollection of this it was the custom to hang small figures and masks on trees at the ceremony in her honour. The district of Ieraco, though in Attica, was on the borders of Boeotia, which latter was the earliest and chief seat of the worship of Dionysus in Greece, with its famous festival on Mount Cithaeron. Festivals of the same character kind spread to Attica, to Mount Parnassus, and north to Thessaly. But in Boeotia Dionysus was personally associated with so many festivals and incidents that he has more the appearance of a hero or demigod than of a god, and it may have been from a sense of this that Herodotus (v. 52) calls him the most recent of the gods. In Homer also he has a secondary character. To what extent the idea of his functions may have been derived from the Vedic god Soma cannot be determined, but the similarity between the two deities becomes the more striking when we remember how actively the worship of Dionysus was conducted in Asia Minor, particularly in Phrygia and Lydia, where he was styled Sabazius, with the epithet also of βορίος, from which it is supposed his Greek name of Bacchos was derived. As Sabazius he was associated with the Phrygian goddess Cybele, and was followed in his expeditions by a θησιος of Centaurs, Pan, Satyrs, and Satyrs. In Lydia his triumphant return from India was celebrated by an annual festival on Mount Tmolus, and it was in Lydia that he assumed the long beard and long robe which were afterwards given him in his character as the "Indian Bacchus." The other incidents in which he appears in a purely triumphal character are his transforming the Tyrrhenian pirates who attacked him into dolphins, as told in the Homeric hymn to Dionysus, and as represented on the monument of Lycurges at Athens, and his part in the war of the gods against the giants. The adventure with the pirates occurred on his voyage to Naxos, where he found Ariadne when she had been abandoned by Theseus. At Naxos Ariadne was associated with Dionysus as his wife, and their marriage was annually celebrated by a festival. (See Ariadne.) Another phase in the myth of Dionysus originated in observing the decay of vegetation in winter, to suit which he was supposed to be slain and to join the deities of the lower world, in which connection he figured in the mysteries of Eleusis. This phase of his character was developed by the Orphic poets, he having here the name of Zagreus, and being no longer the Theban god, but a son of Zeus and Persephone. The child was brought up secretly, wrapped up by Kreusa, but by Zeus discovered where he was, and sent Titas to the spot, who, finding him at play, tore him to pieces, and cooked and ate his limbs, while Hera gave his heart to Zeus. To connect this with the myth of the Theban birth of Dionysus, it is said that Zeus gave the child's heart to Semela, or himself swallowed it and gave birth to the Theban god. Altogether there were, it is said, five different gods "Dionysus," each having different parentage. The conception of Zagreus, or the winter Dionysus, appears to have originated in Crete, but it was introduced into Delphi, where his grave was shown, at which sacrifice was secretly offered annually on the shortest day. This feature of going away in the winter and returning at spring, which was common to Dionysus and Apollo, would commend the former god to the priests of Apollo at Delphi. Dionysus had further, in common with Apollo, the prophetic gift. Like Hermes, he was a god of the productiveness of nature, and hence Pitsas was one of his regular companions, while not only in the mysteries but in the rural festivals his symbol, the phallus, was carried about in a rocket. His symbols, in particular to the kingdom were, the bull, panther, ass, and goat. His personal attributes are an ivy wreath, the thyrsus (a staff with pine cone at the end), a drinking cup (κανθάρος), and sometimes the horn of a bull on his forehead. Artistically he was represented mostly either as a youth of erect nearly human form, or as a bearded and draped man, but frequently also as an infant, with reference to his birth or to his bringing up in Nysa. The earliest images were of wood with the branches still attached in parts, whence he was called Dionysus Desyntrites. He was figured also, like Hermes, in the form of a pillar or term surrounded by his head.

The Greek colonists of Southern Italy (Magnus Graecus) had taken with them the worship of Dionysus, and so successfully had it spread there that Sophocles (Lyt. 1106) speaks of him as the god who rules in Italy. From Campania the joint worship of Dionysus (Laber), Demeter (Ceres), and Kore (Libera) was introduced into Rome, and a temple was erected to them 495 B.C., in obedience to the Sybilline books. But the mysteries which were held in connection with this worship were suppressed by the senate, 158 B.C. In Campania Dionysus was styled Nebon, and conceived in the form of a bull with a human head. Libera, usually identified with Kore, corresponds rather to the goddess Hebe as worshipped at Philus. (A. S. M.)

DIOPHANTUS. See ALGEBRA, vol. i. p 511.

DIPHTHERIA (from δηφθή, a skin or membrane), the term applied to an acute infectious disease, which is accompanied by a membranous exudation on a mucous surface, generally on the tonsils and back of the throat or pharynx. Although popularly believed to be a newly discovered disease, there is distinct evidence that diptheria was known to the ancient physicians as a malady of great virulence. Under the name of the Μάλαυν Αἰγυπτιακόν, Aretasus in the 2d century gives a minute description of a disease which in all its essential characteristics corresponds to diptheria. In the 16th, 17th, and 18th centuries epidemics of diptheria appear to have frequently prevailed in many parts of Europe, particularly in Holland, Spain, Italy, France, as well as in England, and were described by physicians belonging to those countries under various titles; but it is probable that other diseases of a similar nature were included in their descriptions, and no accurate account of this affection had been published till M. Bretonneau of Tours in 1821 had his celebrated treatise on the subject before the French Academy of Medicine. By him the term Le Dipithêre was first given to the disease. The subject has since been largely investigated both in Britain and on the Continent, where epidemics more or less extensive have been of common occurrence in recent times; but while many important facts have been made out

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regarding the pathology of diphtheria, the real nature of the malady still appears to be undetermined. By some it is regarded as primarily a blood poison, the local manifestations being secondary and not essential, while others hold, and this is the view now largely maintained by Continental authorities, that diphtheria is at first a local affection, the constitution becoming secondarily affected or poisoned from the local affection. This latter view receives support both from experiments on inoculation of the disease in animals, and from the discovery in the diphtheritic membranes and surrounding tissues, as well as in the blood and other fluids of persons suffering from diphtheria, of the lower forms of vegetable organisms (bacteria, micrococci, &c.), which are supposed to be the infecting agents both in the local affection and in its general constitutional effects. Whether this be the correct explanation of the disease, or whether as is held by many, these organisms are to be looked upon merely as accompaniments or complications of the affection, not present in all cases, the following facts appear to be made out respecting diphtheria:—

1. That it is a disease communicable both by infection and by contagion.

2. That grave constitutional disturbance is a constant and prominent symptom of diphtheria.

3. That certain important consequences or, as they are termed, sequelae are apt to follow diphtheria, particularly some forms of paralysis.

These points, moreover, serve to distinguish this disease from croup, which, although in some cases presenting certain features of resemblance to diphtheria, differs from it in being a purely local inflammatory affection. See Croup.

As already observed, diphtheria has frequently appeared as an epidemic. It is probably more common in a sporadic form (single cases). It is sometimes endemic in certain localities where the hygienic conditions are bad; and there is ample evidence to show that air or water contaminated with decomposing animal matter may readily cause an outbreak of diphtheria. The influence of climate, weather, and condition of soil appear to be inappreciable. When the disease has broken out in a dwelling it is apt to spread not merely by direct contagion, but apparently also through the air of apartments, thus being notably the case in overcrowded habitations. The contagiousness of diphtheria is very marked, and has unhappily been often exemplified in the case of physicians, who have fallen victims to the disease from inoculation with its morbid products when cauterizing the throats or performing tracheotomy in those suffering from it. Children appear to be on the whole rather more liable to diphtheria than adults; and although the most robust people may be attacked, those whose health is weakened by any cause are specially predisposed. One attack of diphtheria appears to afford no immunity from others.

It must be observed, however, that the mere existence of a sore throat accompanied with some amount of membranous exudation does not constitute diphtheria, as is often erroneously supposed by non-medical persons, who are apt to fancy they have bad diphtheria several times from having suffered from what is a comparatively simple complaint. The diagnosis can only be reliably made by a medical man.

Cases of diphtheria differ as to their intensity from the mildest forms, which resemble an ordinary catarrhal sore throat, to those of the most severe character (such as the gangrenous form), where the disease is hopelessly intractable from the first.

In general the symptoms at the commencement of an attack of diphtheria are comparatively slight, being those commonly accompanying a cold, viz., chilliness and depression. Sometimes more severe phenomena enter into the attack, such as vomiting and diarrhea. A slight feeling of uneasiness in the throat is experienced along with some stiffness of the back of the neck. When looked at the throat appears reddened and somewhat swollen, particularly in the neighbourhood of the tonsils, the soft palate, and upper part of pharynx, while along with this there is a feeling of paresthesia and swelling of the glands at the angles of the jaws. The affection of the throat spreads rapidly, and soon the characteristic exudation appears on the inflated surface in the form of greyish-white specks or patches, increasing in extent and thickness until a yellowish-looking false membrane is formed. This deposit is firmly adherent to the mucous membrane beneath or incorporated with it, and if removed leaves a raw, bleeding, ulcerated surface, upon which it is reproduced in a short period. The appearance of the exudation has been compared to wet parchment or washed leather, and it is more or less dense in texture. It may cover the whole of the back of the throat, the cavity of the mouth, and the posterior nares, and spread downwards into the air passages on the one hand and into the alimentary canal on the other, while any wound on the surface of the body is liable to become covered with it. This membrane is apt to be detached spontaneously, and as it loosens it becomes decomposed, giving a most offensive and characteristic odour to the breath. There is pain and difficulty in swallowing, but unless the disease has affected the larynx no affection of the breathing. The voice acquires a snuffling character. When the disease invades the posterior nares an acrid, fetid discharge, and sometimes also copious bleeding, takes place from the nostrils. Along with these local phenomena there is evidence of constitutional disturbance of the most severe character. There may be no great amount of fever, but there is marked depression and loss of strength. The pulse becomes small and frequent, the countenance pale, the swelling of the glands of the neck increases, which, along with the presence of albumen in the urine, testifies to a condition of blood poisoning. Unless favourable symptoms emerge death takes place within three or four days or sooner, either from the rapid extension of the false membrane into the air passage, giving rise to asphyxia, or from a condition of general collapse, which is sometimes remarkably sudden. In cases of recovery the change for the better is marked by an arrest in the extension of the false membrane, the detachment and expectoration of that already formed, and the healing of the ulcerated mucous membrane beneath. Along with this there is a general improvement in the symptoms, the power of swallowing returns, and the strength gradually increases, while the glanular enlargement of the neck diminishes, and the albumen disappears from the urine. Recovery, however, is generally slow, and it is many weeks before full convalescence is established. Even, however, where diphtheria ends thus favourably, the peculiar sequelae already mentioned are apt to follow, generally within a period of two or three weeks after all the local evidence of the disease has disappeared. These secondary affections may occur after mild, as well as after severe attacks, and are principally in the form of paralysis affecting the soft palate and pharynx, causing difficulty in swallowing with regurgitation of food through the nose, and giving a peculiar nasal character to the voice. There are, however, other forms of paralysis occurring after diphtheria, especially that affecting the muscles of the eye, which produces a loss of the power of accommodation and consequent impairment of vision. There may be, besides, paralysis of both legs, and occasionally also of one side of the body (hemiplegia). These symptoms, however, after continuing for a variable length of time, almost always ultimately disappear.

In the treatment of diphtheria regard must be had both
to the local and general nature of the disease. Difference of opinion exists among physicians as to the utility of topical applications in the form of caustics applied to the affected parts, some attaching great importance to their use as tending to arrest the progress of the disease, while others hold that the irritation so produced favours the spread of the false membranes. Probably at the outset, when the local manifestations are but slight, the use of such a caustic as nitrate of silver, either in the solid form or in strong solution, may be of service, but after any considerable surface has been invaded by the false membrane little good, it is to be feared, can be done in this way. The forcible removal of the false membrane is generally condemned, as by this means a raw bleeding surface is left, upon which the deposit is reproduced with great rapidity. The exudation, however, tends to be cast off spontaneously by a process of suppuration, and, as favouring this, and at the same time acting as a soothing remedy, the inhalation of steam is recommended. The employment, in the form of spray or of washes or gargles, of solutions of carbolic acid, Coudy's fluid, perchloride of iron, chlorine water, the paralytic or the chlorate of potash, is valuable in the way of disinfecting the parts, and subduing the fetid exhalations which are always present. When the disease has spread into the larynx and the breathing is embarrassed, an enema may be of use in checkering the expulsion of the false membrane. It is, however, in great measure to the constitutional treatment that the physician's attention must be directed in diphtheria. The effect of the disease upon the patient's strength is so marked that from the very beginning there is an urgent demand for strong nourishment, which should be freely administered in the form of milk, soup, &c., as long as there exists the power of swallowing, and when this fails nutrient enemata should be resorted to. Large doses of quinine and of the tincture of the perchloride of iron are recommended, and stimulants will in almost all cases be called for from an early period. The question of tracheotomy has to be considered when the false membrane has spread into the air passages and threatens death by asphyxia; and although the operation in such circumstances affords but a feeble chance of success, the cases of recovery by this means have been sufficiently numerous to justify its employment as a last resort. The paralysis or the chlorate of potash, which follows diphtheria usually yields in the course of time to tonics and good nourishment.

It should be mentioned that in all cases of diphtheria means should be taken by isolation of the patient and the use of disinfectants to prevent as far as possible the spread of the disease in a household; while the attendants ought to be scrupulously careful to avoid inoculation with the products of the disease, and should frequently use gargles of some of those substances above mentioned. (O. O. A.)

DIPLOMACY is the art of conducting the intercourse of nations with each other. The word originally owes its origin to the source subsequently explained in the article Diplomatics. It is singular that a term of so much practical importance in politics and history should be so recent in its adoption that it is not to be found in Johnson's dictionary. There has, indeed, ever been a reluctance in the English nature to acknowledge the existence of transacting international business as a pursuit worthy of a British statesman, or as one eutuchiing its adepts to honourable fame. It is popularly looked on as the art of carrying into the business of nations a morality condemned in the intercourse of men with one another, and an art of employing subtilty where force is insufficient to accomplish some statesman's object. Hence the term has been colloquially used to express a modified degree of cunning; and conduct which is wily and subtle, without being directly false or fraudulent, is styled "diplomatic."
In contrast to the old opinions which attributed the power and prosperity of nations to diplomatic ability, overlooking the substantial sources of material progress, a political sect has appeared in recent times who denounce the diplomatic system as foolish or wicked, and proclaim the doctrine of non-intervention in the affairs of other nations. But it is practically clear, however, that whatever degree of perfection the world may reach in time, the first great power which avows this opinion will become the immediate victim of its rival; and thus, should Britain withdraw herself from the diplomacy of Europe, the despotic states would soon become strong enough to shut up the commerce of the world, and cast the world two centuries back in civilization.

It is perhaps scarcely necessary to mention that the source of the diplomatic organization in any nation is its supreme power; but it is useful to keep in view that, for the rapid movements of this department of politics, nations the most jealous of their constitutional rights have been obliged to place at least provisional power in the hands of individual rulers. Thus in Britain the sovereign, independently of Parliament, has technically the power to make treaties and to declare peace and war; and an authority not much less extensive is committed to the president of the United States. The guidance of a great state's relations with foreign countries is generally committed to one department of the Government—with us it is the function of the foreign secretary. How far he is bound to consult his colleagues in his intercourse with foreign states has sometimes been matter of acrimonious discussion. The representatives of the Government at foreign courts, though the dignified character of their missions sometimes gives them a rank much higher than that of their instructor, must obey the directions of the foreign minister. In the negotiation of treaties there is an old-standing dispute among publicists, how far nations can be bound if their ambassadors exceed the instructions given to them, which are generally kept secret. When, therefore, an important international act, such as a treaty, is undertaken, there are many sanctions and ceremonials to be accomplished before it is held to be completed. While matters are in a vague condition, many briefs expressed fundamental suggestions will have passed among the negotiators in the form of notes. When the matter becomes more ripe for adjustment, it assumes the shape of a 'protocol, or draft of the conditions. The ambassadors, when all is adjusted, sign the articles of the treaty; but still it is generally deemed essential that the several Governments should ratify it, or, admitting that their representatives have not exceeded their instructions, engage to fulfill the bargain they have made. In this treaty, whenever treaties affect the private rights of the citizen, they must be ratified by Act of Parliament. In addition to notes and substantive treaties, the most important documents in diplomacy may be considered the manifestoes, in which, paying homage to public opinion and the established rules of diplomacy, Governments profess to justify their conduct. When any act of oppression or injustice is perpetrated, it is generally followed by an able manifesto, and the ingenuity of the accomplished diplomatist is taxed to make the deed appear just, rational, and necessary.

The nature and functions of the large body of officers who chiefly conduct the diplomacy of the world having been described under the heading AMBASSADOR, it only remains to notice the incidental circumstance that custom has for some time established the French language as the language of diplomacy. In the 16th and during a great part of the 17th century, Latin was employed. In Ludlow's memoirs there is, under the year 1656, a curious notice to the effect that the Swedish ambassador "com-
plained of the delays in his business, and that, when he desired to have the articles of this treaty put into Latin according to the custom of treaties, it was fourteen days they made him stay for that translation, and sent it to a Mr. Milton, a blind man, to put them into Latin, who, he said must use an amanuensis to read it to him, and that amanuensis might publish the matter of the articles as he pleased, and that it seemed strange to him there should be nothing left of the blind man capable of putting a few articles into Latin." In turning over the pages of the great collection of treaties by Damont and Rouset, one may observe how gradually, during the ascendency of Richelieu, and the subsequent reign of Louis XIV, the use of the French language radiates from the immediate diplomatic transactions of France over those of Europe at large. Probably its propagation was originally connected with the wishes of that universal French empire to which Louis XIV. seemed to be marching before he encountered the combinations of William of Orange. At the present day it can only be conjectured whether the idea that diplomats had agreed to use one language, and that the best adapted for their peculiar functions.

DIPLOMATICS, the science derived from the study of ancient diplomas, so called from being written on two leaves, or on double tablets. The Greeks used the term more specially for the letters of licence to use the public conveyances provided at the different stations, and generally for public grants. Subsequently it attained a more extended signification, and in more modern times has been used as a general term for ancient imperial and ecclesiastical acts and grants, public treaties, deeds of conveyance, letters, wills, and similar instruments, drawn up in forms and marked with peculiarities varying with their dates and countries. With the revival of literature, the importance of such documents in verifying facts and establishing public and private rights led to their being brought together from the historical works and the monastic registers in which they had been copied, or, in rarer instances, from public and ecclesiastical archives where the originals were still preserved. Then arose questions of authenticity, and doubts of the so-called originals; disputants defended or condemned them; and, in order to establish principles for distinguishing the genuine from the forged, treaties were written on the whole subject of these diplomas. With a view to establish the credit of those preserved in the original, the Benedictine, Dom Mabillon, in the year 1691 produced his masterly work De re diplomatica. - Papal bulls, the decrees of the Reformation, the acts emanating from royal authority anterior to the 13th century are almost exclusively derived from ecclesiastical archives, and consist of foundations of monasteries, and grants of property, privileges, and immunities from the monarchs. In England from the 13th century they are systematically registered in the royal chancery; the series of rolls in which they are written, under different classes, is very complete from the reign of King John. History is greatly indebted to the cares with which religious houses regulated their title deeds. From an early time it was their practice to copy them into volumes, arranging them generally under the name of the property Chartularies of this character of the 10th century are still extant. The chartulary of Winchester Abbey, compiled early in the 12th century, and containing numerous documents of the time before the Conquest, is in the British Museum.

Imperial acts affecting the state at large were proclaimed through the governors of provinces, as in later times, in England royal writs and ordinances were addressed to the sheriffs of the several counties. In England, it would seem, when the object was to appeal to the people, the document was publicly exhibited. When Edward III. landed, as Prince of Wales, on the Yorkshire coast, with the design of overthrowing his father's government, he drew up a manifesto of his purposes, addressed to the citizens of London, who exhibited it on the cross in the Cheapside, placing copies in their windows (Chiro Monasterii de Melia). At all times diplomas have been drawn very much in set forms. The Romans employed official clerks, (secreti), assigning them to the different magistrates. Under the empire they are called tabelliones, and acts as public notaries. After the breaking up of the Roman empire, there was a period when the chanceries of the new states were imperfectly served. The notarial science was partially lost, and, in the general neglect of learning, the composing a public act or private document was a task of difficulty. In the 7th century the monk Marculfus composed a formulary for guidance in drawing up documents of various kinds. It was first published by Bignon in 1613. In Migne's edition, Patrologiae Curium, vol. xxvii, it is accompanied with several anonymous compilations of the same character.

In the 12th and 13th centuries we meet with works of the same kind under the title de arte datuminum. A very interesting collection of precedents of royal warrants, state letters, papal bulls, and other documents, arranged under many heads of subjects, was compiled by the English poet Occleve, while he was a clerk in the council office at the beginning of the 15th century, and is now in the British Museum. We are best able to understand the nature of
early diplomas by examining the originals, still extant, on papyrus or parchment, which go back in date to the 5th century. The oldest come chiefly from Ravenna. They have been commented on by Maffei in his Istoria diplomatica, 1727, and printed in full with facsimiles in the Papiri diplomatici of the Abbate Marino-Marinii, 1805. A considerable number of the original diplomas of the Merovingian and succeeding sovereigns of France have also been preserved, and have been published in facsimile (Letrouls, Diplomata et Chartes), and in letterpress. England also boasts a series of very beautifully written royal charters from the 7th century. The larger number of such are in the British Museum, and are in course of publication in facsimile (Facsimiles of Ancient Charters, parts i. ii. iii.). Many original papal bulls, too, of an early date, are still extant, in different repositories. There is a general uniformity in the diplomas of the earlier times. Taking the French series as examples, we find a regularity of formulas in the following order:—

1. An invocation, as In nomine domini Dei Saluatoris nostrri Iesu Christi.

2. The name and style of the sovereign, and the name and title of the person addressed. In the 6th, 7th, and 8th centuries, the style of the French kings was in general N. Francorum rex, or N. Francorum regnans. From the time of Louis the Debonnaire the form was Divus ordinante (or prope sancte anniversata, or fassente prouidentia, or missiercordia). Popes usually signed the end of the latter half of the 11th century; when, or only rarely before, they used the title Pape Gregory the Great (590-604) introduced the form servus servorum Dei. They placed their names before or after that of the person addressed indifferently, before the 10th century, when the custom prevailed to give it precedence.

3. A preamble, consisting of a moral or religious reflection, or a recital of the motives to the grant. In the earlier times the moral sentiment is expressed briefly, as Memor fons mei, or Paterfamos reforma expleante effugare, but later on it is often of great length and in vain attempts to subdue the barbarity of Greek words.

4. The substance of the act or donation.

5. A protective clause, in the nature of an incensation on such as should infringe the privilege granted, or thwart the object of the act. It is first met with in papal bulls of the 6th century, and appears in an exaggerated form in a later time, the bitterest curses being heaped on the hypothetical offender without measure. The papal type is closely followed in French and English diplomas. In the 12th century it took a milder form, as in papal bulls, Nulli ergo superest quicquam. In the 10th and 11th centuries the casuistical clause was often placed after the date, having sometimes been previously introduced into the text.

6. The Merovingian sovereigns authenticated their diplomas by the addition of their signatures. Those who were unable to write signed with their monogram. The Carolingians signed with a monogram, and the same form prevailed from the 9th century in Germany and Italy. It ceased to be used in France in the 14th century. The clergy adopted the use of the monogram in the 11th and 12th centuries. It is not found in the charters of English sovereigns. In the earlier times the monogram was formed of letters of tall curving character; capitals and minuscules were afterwards more commonly used. Sometimes the word regnus was added. It is possible that the monogram was in some instances entered by the hand of the sovereign, for so much is indicated by the words in which it is introduced, but it was usually added by the chancellor or scribe. It was not used for some kinds of documents, as judgments, decrees, and mandates. In acts of the later Roman emperors, the form of subscription is simply the word Legi, with a cross prefixed, as in a diploma of Valentinian, printed by Marini, p. 94. The name of the referendary or chancellor, with the expression opistha, was in France, in the earliest time, inserted before, subsequently after, the subscription of the monarch. A paragraph of the word subscripsit, and often criron manes, accompanied the subscriptions. Sometimes in royal diplomas, and commonly in private charters, the names of several witnesses were subscribed, each preceded by the word sigrum, with a cross, or followed by subscripsit. In these, in their bulls, originally used the form of Bene salutis, or Bene salute superintendit, in place of subscription of their names, which they applied only to synodal and other public acts. At the beginning of the 9th century they used their monogram. In the 11th century they signed with their own hand. In the 9th century, they also began the practice of adding the subscriptions of cardinals, but it was not commonly followed until the middle of the 13th century. Sentences from the Scriptures were used by popes for a signature, instead of their names, in consistorial bulls in the 11th century. English kings, before the Conquest, neither signed their name nor used a monogram. They affected the sign of the cross—the active adding Signum manus N. regis, or variations of the form.

7. Dating clause. In France, this followed the subscription and attestation. The manner of dating varied at different times, and in different countries. In diplomas of the emperors, the year is not expressed. For example, an act of Valentinian of about 480 A.D. simply the words, Post sextum die post quem. The Merovingian kings and their successors dated by their regnal years, adding the day of the month, the place, and generally the word bulla. Some dated from epochs in their reign, as Louis le Débonnaire from Easter 781, the day of his coronation at Rome; from September 813, when he was associated in the imperial power, and from the 28th of January 814, the day of his accession after the death of Charlemagne.

The year of the incarnation was seldom used by the French kings before the end of the 9th century. In England it was generally added to royal charters in the times preceding the Conquest, but, subsequently to the death of William the Conqueror, it was not commonly followed by the name of the person addressed, before the 6th century, the year of the Greek emperors from 550 to 772; by years of the Greek emperors from 550 to 772; by years of the Greek emperors from 550 to 772; by years of the Greek emperors from 550 to 772; by years of the Greek emperors from 550 to 772; by years of the Greek emperors from 550 to 772; by years of the Greek emperors from 550 to 772; by years of the Greek emperors from 550 to 772; by years of the Greek emperors from 550 to 772; by years of the Greek emperors from 550 to 772; by years of the Greek emperors from 550 to 772; by years of the Greek emperors from 550 to 772; by years of the Greek emperors from 550 to 772; by years of the Greek emperors from 550 to 772; by years of the Greek emperors from 550 to 772; by years of the Greek emperors from 550 to 772; by years of the Greek emperors from 550 to 772; by years of the Greek emperors from 550 to 772; by years of the Greek emperors from 550 to 772.
English charters of the Saxon period have forms in many respects different from those of foreign diplomas. Variations have been already noticed, as, that the king signed neither with his name nor with his monogram, but only with a cross, and that they were dated from the moment of the coronation. It would appear, indeed, that the charters were not drawn up by an officer of the chancery, as in France, but were composed and written by ecclesiastics, who were not employed for the occasion. In the grant of the monastery of Reculver to Christ Church, Canterbury, by King Eadred, in the year 949, to which Dunstan, then abbot of Glastonbury, and one of the king's principal ministers is a witness, he states that he both drew up the form and wrote the document with his own hand. It is on this account that we find in English charters before the Conquest a variety of styles of writing, even in those of the same date; whereas on the Continent the writing is uniform in the several states. In the absence of a strictly official character, the grant was attested by numerous witnesses, varying from four or five, the more ordinary number in the earlier times, to from 30 to 100 subsequently. For it was always an object with the religious houses in whose favour a grant was made to fortify its authority and secure its recognition by impressive solemnities. They made the benefaction a religious act by inviting the grantor to offer the charter to God on the altar of their church; and they obtained the approval and attestations of the members of the court, or of the council over which the king might be at the time presiding. The names which are subscribed to the English charters add greatly to their historical value. A difference in another respect from the foreign types is attended with advantage to the study of both the language and manners of the time. The property conveyed was defined by a minute description of its boundaries, written in English; and, as the documents are dated and can generally be referred to special locales, dialectic differences and the formation of names, with other incidental lights on subjects of antiquity, are preserved. In English charters of as early a date as the 9th century, and from that time onwards, is sometimes found, at the top or the bottom, the upper or lower half of a chapter, or even in large letters between the copies, and the skin was then divided. The line of division was at a later period generally bent, and the document was called an incunabulum. The custom was not introduced into France until the middle of the 11th century.

The practice of forging and falsifying diplomas, ecclesiastical constitutions, and documents of all kinds, is traced back to very early times. The laws of the Vaugouls of the 7th century enact severe punishments on offenders of this class, as do the Capitula of Charlemagne. The English chronicler Horæden, in the year 1196, gives an account of wholesalers forgers of papal bulls and brevets by an agent of the archbishop of York. A decretal of Innocent III (1195-1216) gives rules for detecting forged bulls (Epist. i. 201, ed Baluz). It was so easy to impose upon the ignorance of people, and the temptations to falsify were so great, that we cannot doubt it was done extensively. The science of diplomatology was at a later period generally bent, and the document was called an incunabulum. The custom was not introduced into France until the middle of the 11th century.

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DIPPEL, JOHANN CONRAD (1673-1734), a German theologian and alchemist, who assumed as an author the name "Christianus Democritus," was born at the castle of Frankenstein, near Darmstadt, his father being a Lutheran clergyman. He studied at Gnesen, where he took the degree of master in philosophy in 1693. After a short visit to Wittenberg he went to Strasburg, where he delivered lectures on astrology and chiroiomy, and occasionally preached. He gained considerable popularity, but was obliged after a time to quit the city, owing to his irregular manner of living. He had a suspicion of having been concerned in a murder. He had up to this time espoused the cause of the orthodox as against the pietists, and had justified his views and worldly habits on the ground that he intended to make a public protest against pietism, but in his "Two first published works, Orthodoxa Orthodoxorum (1697) and Papismus uniparentale Protestantatum (1698), he assailed vehemently the fundamental positions of the Lutheran theology, denying the inspiration of Scripture, the efficacy of the sacraments, and the doctrine of justification by faith. He held that religion consisted not in dogma, but exclusively in love and self-sacrifice. To avoid persecution he was compelled to wander from place to place, and he resided successively in various towns of Germany, Holland, Denmark, and Sweden. He took the degree of doctor of medicine at Leyden in 1711. From 1693 he devoted himself to experiments in alchemy, which wasted a considerable fortune, and he was frequently imprisoned for debt. He made several valuable discoveries in chemistry, one being Prussian blue, and another an oil, still known as Dippel's animal oil, which he offered as a panacea, and which has useful medicinal properties of a more limited kind. Provoked by false reports of his death, he published in 1733 an intimation that he would live until 1808. In spite of this, however, he died at Berlinburg on the 25th April 1734.

An enlarged edition of Dippel's collected works was published at Berlin in 1748. See a somewhat too eulogistic biography by Ackermann (Leipsic, 1871), and a memoir by Buchner in the Historien-chronik Triebhabuch for 1858.

DIPSIOMANIA. See Mental Diseases.

DIPTERA ( Aristotle, from δια, double, and τερα, wings), an Order of the Insecta, containing the "flies" proper. It is so called, with which also, in spite of not possessing its chief characteristic, the sub-order Aphaniptera (flies), a part of the obsolete Apera, is now incorporated. The Diptera proper (with the exception of the apterous Nymphalidae, and a few aberrant species of other families, to which the majority of the characters given will not strictly apply, but which cannot, from their general structure, meta-
morphoses, habits, or evident natural affinities, be separated from the Order under consideration) have the following characters:—wings two, mesothoracic, membranous, mostly horizontal and transparent, not capable of being folded, with nerves generally few and longitudinally disposed, and having a pair of suture at the base; metathoracic wings replaced by a pair of halteres or balancers; mouth anlage (whence the Fabrian name Antista for the Order), with a proboscis formed of the labium, inclosing modifications of other usual parts of the mouth, except of the labial palpi, which are wanting; tarsi 5-jointed; prothorax reduced to a very small collar. They are divided into two sections—the Orthorrhapha, in which the pupa is incompletely formed (the details of the future perfect insect being visible), and the Cyclophragma, in which the pupa is coroate (of a hard, uniform surface, cylindrical, rounded at the extremities). The Orthorrhapha are again divided into two sub-sections—the Nematocera (antennae composed of more than 6 joints, palpi 4- or 5-jointed), and the Brachycera (antennae usually reduced to less than 3 joints), palpi 1- or 2-jointed. Of these, the Nematocera comprise three tribes, viz.:—1, the Oligonemora, in which the wings have very few nerves (fam. Cecidomyiidae); 2, the Ephydrida, in which the larva has a distinct head (fams. Mycetophilidae, Bibionidae, Rhabididae, Simuliidae, Chromiidae, Galleria, and Psychodidae); and 3, the Polyneura, in which the wings have many veins (fam. Tipulidae). The Brachycera also comprise three tribes, viz.:—1, the Cycloracera, in which the third joint of the antennae is annulated (divided into two groups—a, Notanematidae, mamma, Stratiomyidae, Xylophagidae, and Achantomoridae; and b, Tanytarsina, = fams. Tabanidae and Leptidae); 2, the Orthocera, in which the antennae are normal (divided into two groups—a, Polytoma, = fams. Theronidae and Scenopinidae; and b, Proechtha, = fams. Acrideridae, Bombylidae, Nemestrinidae, Mydidae, Asilidae, Empididae, and Dolichopodidae); and 3, the Acroptera, in which the wings are pointed (fam. Lonchopteridae). The Cyclophragma (in like manner are divided into two sub-sections—the Prococida, possessing a proboscis, and the larvae having an osphagical frame; and the Proplebidae (also variously termed Coriacea or Pupiparae), in which the proboscis is wanting, the body leathery, and the larvae have no osphagical frame. Of these, the Prococidae comprise three tribes, viz.:—1, the Hypocera, in which the antennae are inserted quite close to the mouth (fam. Phoridae); 2, the Pseudonemora, in which the wings have a false longitudinal veinlet (fam. Syrphidae); and 3, the Eumyidae, or type flies (fams. Perniciosidae, Platystomidae, Conopidae, Muscidae, and Oestridae). The Proplebidae comprise three families, all parasitic,—the Hippoboscidae, Nyceritidae, and Streblidae, the latter a very limited and aberrant group stated to be oviparous, and having the wings distinct and well veined, unlike the Nyceritidae.

The sub-order Aphanaptera consists of two families only, the Psocera (an entirely cocciceous, much compressed or flattened, and destitute of wings or balancers, these organs being represented by more or less obsolete leathery plates; they have 3- or 4-jointed antennae, 4-jointed maxillary and 3-jointed labial palpi, and 5-jointed tarsi. The larvae of some of them are known as vermiform, and the pupa inactive, incomplete. If not considered as a sub-order, these two families would apparently have to be placed at the head of the Eucephalous Nematocera,—in that case, of course, deranging the characters given for that tribe.

Other families of the Diptera have been proposed, but need not be here noticed, being as yet scarcely established, or merely entitled to the rank of sub-families (the Muscidae especially comprising many of the latter).

The Diptera, in number of species and individuals (very many having swarming propensities) are considered to be the order of unprimed beings most diffused over the globe; and the extremes of heat and cold seem alike indifferent to them. They have long been known to abound in very high latitudes; and, among the insects brought back by Captain Fildén, the naturalist attached to Sir George Nares’s Arctic expedition, were Dipterous species of apparently the most feeble organism. The Rev. A. E. Eaton, attached as naturalist to the late “Tranist of Venus” expedition, discovered also, on the desolate shores of Kerguelen’s Island, Diptera of a degraded type suitable to the climatic peculiarities of the locality. Tropical countries naturally furnish the most developed and in some cases extraordinary forms,—the genera Fannina, Xanthomomyia, Acheta, Diopsis, and Ephydria, and various species of Scenopinus, which, are long been known to the scientific world, as well as to the practical man. They have long been known to a be among the worst enemies of man himself spared; the petty inconveniences of wasted food, broken rest, and slight personal
pain or irritation experienced in temperate regions from fly-larvae, gnats, midges, etc., and the parasitic species, are distributed in the warmer and more boreal countries to a dangerous extent, and even has been found prejudicial to life. There are many recorded instances of the larvae of *Diptera* feeding upon the human intestinal canal, and of species (dubiously referred to *Gestra*) attacking man; as also of lostsome cases of individuals being eaten alive by the larvae of flies, or devoured by the persons of beggars. Various cases have, moreover, been noted of the diffusion of the germs of disease by flies; and instances of death from transfusion of putrid animal matter in New Caledonia have also been recorded.

One of the *Musca*

*Lucina komaie*, known to have caused considerable destruction to human life among French convicts in Cayenne, laying its eggs in the mouth or nostrils during sleep; and a very frequent account of much disease and death in man and domestic animals at Mohilew, by a similar action of another of the same family, *Sarcophala waldhauri*, has been given by Portchnsky, a Russian naturalist. It is perhaps superfluous to speak of mosquitoes, too well known since the Biblical "plague of flies;" but it may be observed that the corresponding plague of sand-flies, *Simulium*, so well known to affect the eyes of suffragents from ophthalmia in Egypt, has made its appearance in the deserts of West Australia, where the last exploring expedition of Mr. Ernest Giles suffered severely from it.

The antiquity of the fly is scarcely more than historical. Very few fossil species are known (5 only being recorded from the Solnhofen lithographie Oolite), but the more recent "flies in amber" are so constantly found that the expression has become a common proverb.

(k. c. r.)

**DIPTYCH**

A double tablet made with a hinge to open and shut. Dipyts were used in the time of the Roman empire for sending letters—"mainly love letters," says Faccolati, quoting the scholast to Juvenal ix. 36, whose note does not, however, seem to imply much. The consul and questors used, on assuming office, to send diptychs containing their names and portraits to their friends. The exterior of the leaves was often ornamented with other paintings. The tablets were made, the more ordinary kind of boxwood or maple, the richer sort of cedar, of ivory, of silver, and sometimes even of gold. They were very frequently sent by friends to each other as presents at the beginning of a new year. The early Christians used tablets thus made in the celebration of divine worship. At Cardinal Noris (Dianetar, de Ilst. Synod) expresses much learning in showing, what is very evident, that the Christians adopted the use of them from that of the consular diptychs. They were placed on the "ambones,"—the pulpits, or reading desks, which may still be seen in ancient basilicas at the west end of the choir or presbytery; and from them were read to the congregation of the faithful the names of the celebrating priests, of those who occupied the superior positions in the Christian hierarchy, of the salutes, martyrs, and confessors, and, in process of time, also of those who had died in the faith. It is the diptychs that are referred to by the early Christian writers in the names of "myotic tablets," "anniversary books," "matriculation registers" of the church, and sometimes "books of the living," or "books of life." The word is also occasionally found used in other senses, e.g., for the priest's vestment, which was usually folded in two (see Duscase, ad loc.) When it became customary to write in the diptychs names so numerous as those of the different classes of persons above mentioned, it will be easily understood that it became impossible to inscribe them on two tablets of convenient size. Hence the diptychs became *triptichs*, i.e., consisting of three such conjoined tablets.

But, though triptychs are often spoken of in the art-language of a later time, these were by the early church writers still called diptychs; and continued to be so called, even when many learnedly probably of parchment in some cases, though more frequently of wood, were introduced between the two original folds of the diptych, thus forming a veritable book. The inscription on the diptychs of deaths and baptisms, naturally led to the insertion of dates, and the diptychs seem thus to have grown into calendars, and to have been the germ from which necrologies, lists of saints, and almanacs have been developed. Much doubt exists as to the time when the use of diptychs to read from died out in the church. The best opinion seems to be that their use lasted to about the end of the 8th century. The outsides of the diptych folds being often very richly ornamented, their preservation was carefully attended to, and even those which were ornamented with precious paintings or carvings were often to be found in use in the primitive churches. This ornamentation caused the diptychs to be adopted in the water of baptism and used as adornments for the altar. And in this position, by a natural process of development, the ornamentation became the main end and object of the thing itself. The best practitioners of the time employed their talents in painting the diptych—generally in the form of triptychs, and the number of folding doors, so that the triptych when closed showed two subjects, often the portraits of the donor and his wife, and when open three paintings, —hence the very large number of diptychs and triptychs which are found in our museums and galleries.


**DIRCE**, in Greek legend, the personification of a fountain (and stream) at Thebes, from the water of which Hercules derived part of his strength, and which was usually identified with the fountain of Are in the legend of Cadmus. Besides, the fountain was the grave of Dirce, at which sacrifices for the dead and other rites were performed. According to the legend, Dirce, the wife of Lycur, king of Thebes, had sorely persecuted Antipo, who at last escaped to Mount Citharon, where her twin sons Amphion and Zethus were being brought up by a herdsman unconscious of their parentage. Mother and sons met, but had not recognized each other, till Dirce, who had come to the hill for a Dionysiac ceremony, proposed that Amphion and Zethus should tie Antipo to the hams of a wild bull to be dragged to death. They were about to do thus when the herdsman announced their relationship, and they then tied Dirce to the bull instead. She was dragged by it over the hill to the fountain into which she was transformed.

**DIRSCHAU**, in Polish Scnesoe, a town of Prussia, in the government of Dantec and district of Stargard, on the left bank of the Vistula, at a railway junction about twenty miles S. S. E. of Dantec. Besides dealing in wood and cattle, it displays considerable industrial activity in the manufacture of agricultural implements, iron and tin ware, and cement, but its principal claim to attention is the lattice-work iron bridge, thrown across the river in 1850-1857, which, with its total length of 2726 feet and its six spans of 410 feet each, is a noble testimony to the engineering skill of Lentze and Schaus, and affords a passage for the railway between Königsberg and Berlin, over two ordinary carriage roads, and two sideways for foot passengers. Unfortunately, as it lies only about 12 feet above the highest level attained by the river, and there is no opening for the passage of ships, it is necessary in passing under it to remove or drop the masts. J. Forster, the traveller, was born at Dirnschau in 1729. Population in 1875, 9727.
DISCUS, a quoit, or circular plate of stone or metal, 10 or 12 inches in diameter, which was used by the ancient Greeks and Romans for throwing to a distance as a gymnastic exercise. Sometimes a kind of quoit of a spherical form was used for the same purpose; and through a hole in its centre a thong was passed, to assist the player in throwing it. Status, in 745 B.C., 746–741, fully explains the manner in which the discus was used. In the British Museum there is a copy of a famous statue by Myron of a discobolus in the act of throwing the discus.

DISINFECTANTS are agents or substances employed to prevent the spread of contagious or infectious diseases. Recent investigations all tend to demonstrate that the efficiency of any disinfectant is due to its power of destroying, or of rendering inert, specific poisons or disease germs which possess in themselves an independent existence, and which, when introduced into the animal system, under favourable conditions, increase and multiply, thus producing the phenomena of special diseases. Therefore, antiseptics, substances which check or stop putrefactive decay in organic compounds, by preventing the growth of those minute organisms which produce putrefaction, are, on that account, disinfectants. So also doodorizers, which act by oxidizing or otherwise changing the chemical constitution of volatile substances disseminated in the air, or which prevent noxious exhalations from organic substances, are in virtue of these properties effective disinfectants in certain diseases. A knowledge of the value of disinfectants, and the use of some of the most valuable agents, can be traced to very remote times; and much of the Levitical law of cleansing, as well as the origin of numerous heathen ceremonial practices, are clearly based on a perception of the value of disinfection. The means of disinfection, and the substances employed, are very numerous, as are the classes and conditions of disease and contagion they are designed to meet. Nature, in the oxidizing influence of freely circulating atmospheric air, in the purifying effect of water, and in the powerful deodorizing properties of common earth, has provided the most potent ever-present and acting disinfecting media. Of the artificial disinfectants employed or available three classes may be recognized:—1st, volatile or vaporizable substances, which attack impurities in the air; 2d, chemical agents for acting on the diseased body or on the infection disease germs therefrom; and 3d, the physical agency of heat and cold. In some of these cases the destruction of the contagion is effected by the formation of new chemical compounds by oxidation, deoxidation, or other reaction, and in others the conditions favourable to life are removed or life is destroyed by high temperature. Of the first class—antiseptic disinfectants—those most employed are the gaseous sulphurous anhydride, the fumes of nitrous acid and other acid substances, including vaporized carbolic acid, with chlorine gas and the vapours of bromine and iodine. The use of sulphurous anhydride, obtained by burning sulphur, is of great antiquity, and it still is unequaled as a disinfectant in air on account both of its convenient and general efficacy. Camphor and some volatile oils have also been employed as air disinfectants, but their virtues lie chiefly in masking, not destroying, noxious effluvia. In the 2d class—non-gaseous disinfecting compounds—all the numerous antiseptic substances may be reckoned; but the substances principally employed in practice are oxidizing agents, as potassic manganates and permanganates (Condy's salts), and solutions of the so-called chlorides of lime, soda, and potash, with the chlorides of aluminum and zinc, soluble sulphates and sulphites, solutions of sulphuric acid, and the tar products—carbolic, cresylic, and salicylic acids. Dr. J. Dongall of Glasgow found the following substances the most powerful in destroying minute forms of life—sulphate of copper, chloride of aluminium, chronic acid and bichromate of potassium, bichloride of mercury, benzonic acid, bromal hydrate, chloral hydrate, hydrocyanic acid, alum, hydrochloride of strychnia, ferrous sulphate, arsenious acid, and paraic acid. Of the physical agencies heat and cold, the latter, though a powerful natural disinfectant, is not practically available by artificial means; heat is a power chiefly relied on for purifying and disinfecting clothes, bedding, and textile substances generally. Different degrees of temperature are required for the destruction of the virus of various diseases; but as clothing, &c., can be exposed to a heat of about 250° Fair. without injury, provision is made for submitting articles to nearly that temperature. For the thorough disinfection of a sick-room the employment of all three classes of disinfectants, for purifying the air, for destroying the virus at its point of origin, and for cleansing clothing, &c., may be required.

DISLOCATION. This term is applied in surgery to the displacement from each other of the cartilaginous or articular surfaces of the bones entering into the formation of a joint. In a normal joint these surfaces are in contact and held together by ligaments and muscles; in a dislocated joint they are separated more or less completely—in the great majority of cases by external violence; in some instances, however, by powerful muscular exertion. The ease with which a joint is dislocated varies with the form and structure of the joint and with the position in which the joint is when the force is applied. The relative frequency of fracture and dislocation depends on the strength of the bones above and below the joint relatively to the strength of the joint. These points may be illustrated by examples from the joints of the arm and leg, because, with perhaps the exception of the joint between the lower jaw and the skull, it is in these situations that dislocation is most frequently observed. The strength of the different joints in the body is dependent on either ligament, muscle, or the shape of the bones. In the hip, for instance, all three sources of strength are present; therefore, considering the great leverage of the long thigh bone, the hip is rarely dislocated. The shoulder, in order to allow of extensive movement, has no osseous or ligamentous strength; its strength is muscular, therefore it is frequently dislocated, because the muscular strength varies in power, the muscles may be relaxed, the person is unprepared, and dislocation is more dangerous if, on the other hand, the muscles are tense, and the patient is prepared for the strain, then the result will be either a sprain of the joint or a fracture of one of the adjoining bones. The wrist and ankle are rarely dislocated; in the wrist the radius gives way, in the ankle the fibula, these bones being relatively weaker than the respective joints. The wrist owes its strength to ligament, the ankle to the shape of the bones. The elbow is powerfully strong, but this strength necessarily varies with the position of the arm. The symptoms of a dislocation are distortion and limited movement, with absence of the grating sensation felt in fracture when the extremities of a broken bone are rubbed together. The treatment consists in reducing the dislocation. The sooner this is done the better—the longer the delay the more difficult it becomes to remedy the displacement. After a variable period, depending on the nature of the joint and the age of the person, it may be impossible to replace the bones. The result will be a more or less useless joint. The administration of chloroform, by relaxmg the muscles, will facilitate the operation of reduction. The length of time that a joint has to be kept quiet after it has been restored to its normal shape depends on its form; if osseously strong, then early movement is allowable, as in the elbow joint; if osseously weak, then early movement is unjustifiable. More especially is this the case when, associated with consequ-
weakness, the strength of the joint is ligamentous, as in
the sterno-clavicular and superior radio-ulnar articulations.
In such joints the bones must be kept in accurate position and
at rest for a lengthened period, if movement is
allowed soon after the accident the bone will again slip out of
its place.
DISMAL SWAMP, the name given to two extensive
stretches of morsus on the eastern seaboard of North
America. The larger of the two, distinguished as the
Great Dismal, lies in the peninsula between the James
River on the north and Albemarle Sound on the south,
and thus belongs partly to Virginia and partly to North
Carolina. Its length from north to south is about 40
miles and its breadth about 25. The greater part of the
area is covered with a thick stratum of spongy vegetable
soil, without any mixture of earthy particles, which at once
supports and is augmented by a luxuriant growth of
aquatic plants, brushwood, and timber. The prevailing
trees are cypress, juniper, and white cedar, and on the
higher ridges oak and beech. By a curious arrangement,
unusually described by Sir Charles Lyell in his Travels
in North America, the surface of the swamp is actually higher,
in some parts by as much as 12 feet, than that of the
surrounding country; so that, except on the western side,
where it receives a few small streams, the waters flow
outwards. The centre is occupied by Drummond's Lake,
an oval basin about 6 miles long and 3 wide, with
perpendicular banks and an extreme depth of 15 feet; the
water is clear and abounds with fish. The swamp has long
furnished large supplies of timber, much of which has been
obtained by excavation from the peaty soil in which it was
preserved. The tract is facilitated by means of canals,
of which the two most important are the Dismal Swamp
Canal, uniting the western branch of Elizabeth river with
the Pasquotank, and the Chesapeake and Allemande Canal,
connecting the eastern branch of Elizabeth river with Currituck Sound. The forere is flanked by a stage road,
which terminates in the south at Elizabeth City, and in the
north at Norfolk. Two lines of railway pass through the
outskirts of the Virginian portion of the swamp.
The Little Dismal is of much less importance. It lies in
North Carolina, in the peninsula between Albemarle Sound
and Pamlico Sound, and in the days when slavery was
still legal, it was a noted harbour of runaway negroes.

DISPENSATION is a term used by the canons to
signify an act of jurisdiction by which the rigour of
the general law is relaxed in a particular case. Regarded
from this point of view a dispensation is considered by the
canons not to be an exception to, but a complement
under the law, and it is granted with discretion in cases where
the law would otherwise work injustice. "Fuit dispensatio
inventa, ut easem pare distributum justitiae." The exercese
of this jurisdiction in the earlier days of the Christian
church was vested in respect of minor matters in the
bishops, and in more important matters in the provincial
councils; but by degrees this latter jurisdiction came to be
exercised by the patriarchs exclusively, and ultimately,
in the case of the Western Church, by the Pope alone,
who, at the time of the Reformation of the Anglican
Church, had acquired for the Holy See supreme authority
in all the more important matters of dispensation. It was one
object of the Parliament of England, by the statute
"concerning Peter Pence and Dispensations" (28 Henry
VIII. c. 21), to divest the Pope of the exercese of
any powers of dispensation within the realm of England,
for forbidding the king and supreme authority in such
matters to pass to the Pope; or to the Holy See for any dispensation. The Parliament
further vested the power of granting dispensations, such as
had been hitherto obtained from the see of Rome, in the
archiepiscopal see of Canterbury—subject, however, to the
limitation that they should be only granted for such causes
as were not contrary or repugnant to Holy Scripture or to
the laws of the realm, and for this purpose the archbishop
of Canterbury was empowered to constitute a sufficient
commission, and a clerk who should write and register all
such dispensations. The representative of the clerk so
appointed by the archbishop is the registrar of the office
of faculties, over which the master of the faculties
presides, as the archbishop's commissary. The matters for
which dispensations were accustomed to be granted from
the office of faculties, in the reign of Henry VIII., have
almost all become obsolete, or have been withdrawn from
the cognizance of the master of the faculties, and the
special authority of his court in the present day consists in
the grant of special licences for marriages, which are
valid in both the provinces of Canterbury and of York, and
the right of granting which has been preserved to the
archbishop of Canterbury in all subsequent marriage Acts.
These special licences are simply dispensations for the
solemnization of marriage at other times and in other places
than those in which marriage is restricted by the Anglican
canon or by the statute law of the realm.

D'ISRAELI, ISAAC (1766-1848), was born at Enfield
in May 1766. He belonged to a Jewish family which,
having been driven by the Inquisition from Spain, towards
the end of the 16th century, settled as merchants at
Venice, and assumed the name which has become famous.
In 1748 his father, then only about eighteen years of age,
removed to England, where, before passing the prime of
life, he amassed a competent fortune, and retired from
business. Both he and his wife gradually dropped
connection with their co-religionists, with whom their son never
appears to have associated himself.

The strongly marked characteristics which determined
D'Israeli's career were displayed to a singular degree even in
his boyhood. He spent his time over books, and in long
day-dreams, and evinced the strongest desire for business
and all the more binding pursuits of life. These inclina-
tions met with no sympathy from either of his parents,
whose ambitions plans for his future career they threatened
to disappoint. At length, when he was about fourteen, in
the hope of changing the bent of his mind, his father sent
him to school at Amsterdam, where he remained four or
five years. Here in the principal's library, and under the
principal's influence, he studied Bayle and Voltaire, and
became an ardent disciple of Rousseau. Here also he wrote
a long poem against commerce, which he produced as an
exposition of his opinions when, on his return to England,
his father divulged his son's secret and annulling the
permission which he had granted him, placed him in a com-
mercial house at Bordeaux. Against such a destiny his
mind strongly revolted, and, in this extremity, it was
natural that he should eagerly seek the sympathy and
favour of a literary friend. He carried his poem, with a
letter earnestly appealing for advice and assistance, to
Samuel Johnson, but when, full of eager hope, he called
again a week after to receive an answer, the packet was
returned unopened—the grand old man was on his death-
bed. He also addressed a letter to Dr. Vicesimus Knox,
in a tone of the loftiest sentiment, displaying all his
literary aspirations, his earnestness and simplicity of
heart, and his utter lack of all the qualities of "that
despicable thing" (as he called him) "a mere man of
the world," and begging to be received into the scholar's family,
that he might enjoy the benefit of his learning and ex-
perience. How this application was answered we do not
know. The evident firmness of his resolve, however, was
not without effect. His parents gave up their purpose for a
time. He was sent to travel in France, and allowed to
occupy himself as he wished; and he had the happiness of
spending some months in Paris, in the society of literary
men, and devoted to the literary pursuits in which he delighted.

In the beginning of 1788 he returned home, being then a few months past his majority, to lay the first stone of his literary fame by an attack on Pope Findar, under the form of a poem in the manner of Pope On the Abuse of Satire. Published, as it was, at a most appropriate moment, it at once attained popularity. Its authorship became the great subject of debate in literary circles, and it was by some to Hayley, upon whom it actually was revenged, with characteristic savagery, by its victim. It is greatly to Wolcott's credit that, sensitive though he was to attacks upon himself, he at once, on learning his mistake, sought the acquaintance of his young opponent, towards whom he seems to have borne no malice, and whose friendship he remained to the end of his life. But of all the fortunate issues of this success not the least fortunate was that it brought D'Israeli what he had so long earnestly desired—the friendship of a refined man of letters. Through it he made the acquaintance of Henry James Fye, who helped to persuade his father that it would be better for him to study until he reached the advanced age of twenty-eight years of age, and which doubtless was chiefly caused by his sedentary habits. He was able to maintain his strenuous and extraordinary devotion to study till he reached the advanced age of seventy-two, when, though still in the enjoyment of unimpaired health, and in the very midst of what would have been his greatest undertaking, he was forced, by paralysis of the optic nerve, to give up work almost entirely. He lived ten years longer, and his death, which took place at his seat at Bradenham House on the 19th January 1848, was due not to age but to an epidemic which carried him off after a few hours' illness.

Isaac D'Israeli is most celebrated as the author of the Curiosities of Literature, by far the best and most popular of all the many works of the kind which have appeared in England. It is a miscellany of literary and historical anecdotes, of original critical remarks, and of interesting and curious information of all kinds, animated by genuine literary feeling, taste, and enthusiasm. The first volume was published anonymously in 1796, and it immediately attained the popularity it deserved. Two years later it was followed by a second volume; it was not, however, till the lapse of twenty-four years that the third made its appearance. Three other volumes were subsequently added, and in the later editions the first two volumes were much improved. With the Curiosities of Literature may be appropriately classed D'Israeli's Miscellaneous, or Literary Recreations (1796), the Catamities of Authors (1812), and the Querelles of Authors (1814). Towards the close of his life D'Israeli formed the project of embodying his wide knowledge of English literature in a continuous history; but of this he was prevented by illness from publishing more than three volumes, which appeared under the title of the Amenities of Literature. But of all his literary works the most interesting and delightful is his Essay on the Literary Character (1795), which, like most of his writings, abounds in illustrative anecdotes. His contribution to the famous "Pope controversy" in which Bowles was vigorously attacked by Byron and Campbell is asserted, the poetical merit and personal worth of the 18th century,—a defence of Pope criticism of Spence's Anecdotes contributed by Review (July 1820)—is of interest, both as indicating the nature of his critical views, and as founded upon elaborate study of the life and era of his poet. He also published a slight sketch of Jewish history, and especially of the growth of the Talmud, entitled the Genius of Judaism, as well as a few poems in imitation of Pope, and several novels.

He was, besides, the author of two historical works—a brief defence of the literary merit and personal and political character of James I. (1816), and a work of considerable research and magnitude entitled a Commentary on the Life and Reign of King Charles I. (1828-31). The latter work was recognized by the University of Oxford, which conferred upon the author the honorary degree of D.C.L. As an historian D'Israeli is distinguished by two characteristics. In the first place, he had small interest in politics, and no sympathy with the passionate fervour, or adequate appreciation of the importance, of political struggles. And, secondly, with a laborious zeal then less common than now among historians, he sought to bring to light fresh historical material by patient search for letters, diaries, and other manuscripts of value which had escaped the notice of previous students. Indeed, the honour has been claimed for him of being one of the founders of the modern school of historical research, whose patient labours have thrown so much light upon important events and characters. Of the amiable personal character and the placid life of Isaac D'Israeli a charming picture is to be found in the brief memoir prefixed to the Curiosities of Literature, by his son the Earl of Beaconsfield, from which the following may be quoted:—Isaac D'Israeli "was a complete literary character, a man who really passed his life in his library. . . . He disliked business, and he never required relaxation; he was absorbed in his pursuits. In London his only amusement was to ramble among booksellers; if he entered a club, it was only to go into the library. In the country he scarcely ever left his room but to saunter in abstraction upon a terrace, muse over a chapter, or coin a sentence. . . . He had by nature a singular volatility which never deserted him. His feelings, though always amiable, were not painfully deep, and amid joy or sorrow, the philosophic vein was ever evident. He more resembled Goldsmith than any man I can compare him to; in his conversation, his apparent confusion of ideas ending with some felicitous phrase of genius, his naiveté, his simplicity not untouched with a dash of sarcasm affecting innocence—one was often reminded of the gifted Burke and Johnson. There was, however, one trait in which my father did not resemble Goldsmith; he had no vanity. Indeed one of his few infirmities was rather a deficiency in self-esteem."
second might be called "destructive distillations," if it were not customary to reserve the term for the particular case in which the substance operated on consists of vegetable or animal matter which is being decomposed by the application of heat alone, i.e., without the aid of reagents.

The general object of simple distillation is the separation of substances of different degrees of volatility. The apparatus used varies very much according to the nature of the substance operated on and of the product extracted, and according to the scale on which the operation is carried out. Of the various contrivances used in chemical laboratories, the simplest is a glass retort, the descending neck of which is inserted into, and goes to the bottom of, a slanting globular flask. The retort serves for the reception of the substance to be distilled, and is limited by means of charcoal or gas fire, the vapours pass into the flask, which is kept cool by a continuous current of cold water running over it, or, in the case of more volatile substances, by being immersed in ice or some freezing mixture. This somewhat primitive arrangement works satisfactorily only when the vapours are easily condensable, and when the product is meant to be collected as a whole. In the majority of cases, however, the distillate has to be "fractionated," i.e., collected in a number of separate, consecutive portions, and it is then desirable that the apparatus should be so constructed as to enable one at any moment to examine the distillate as it is coming over. For this purpose it is necessary to condense the vapours on their way to, and not within, the receiver, so that the latter can, at any time, be removed and replaced by another. The condenser most generally used in chemical laboratories is that known as Lufty's condenser. It consists of a straight glass or metal tube, 1 to 3 feet long and $\frac{1}{2}$ to 1 inch wide, fitted co-axially, by means of collars or indiarubber tubes, into a wider tube (made of glass or iron) which communicates at the lower end with a water tap, and at the upper with a sink, so that a stream of cold water can be made to run against the current of the vapour. The condenser tube is fixed in a slanting position, and the vapours made to enter at the upper end. The dimensions of the condenser and rate of water-flow depend on the speed at which the vapour is driven over, and on the temperature of that vapour, and, last not least, on the latent heat of the vapour and specific heat of the distillate. To show the importance of the last-named point, let us compare the quantities of heat to be withdrawn from 1 lb of steam and 1 lb of bromine vapour respectively, to reduce them to liquids at 0° C. We have

- For the temperature of the vapour
- Water at 100° C.
- Bromine at 63° C.

- For the latent heat
- Water = 596° C.
- Bromine = 35° C.

- For the specific heat of the liquids
- Water = 0° 106
- Bromine = 35° 6

The withdrawal of 593 units of heat from 1 lb of bromine vapour reduces it to liquid bromine at 0° C. By the withdrawal of $\left(\frac{100}{62} \times 593\right) = 83$ units from the steam, as an easy calculation shows, only 0.18 lb of liquid water, of even 100°, could be produced—hence more than 0.84 lb of steam remains uncondensed (at a temperature of about 96° C., assuming the steam to remain saturated, and to have the temperature of the condensed water). But obviously a condenser under all circumstances is the more efficacious the greater its surface and the thinner its body. It is also obvious, ceteris paribus, that the most suitable material for a condenser tube is that which conducts heat best. Hence a metal tube will generally condense more rapidly than one of glass, and for metal tubes copper is better than tin, and silver better than either. In chemical laboratories glass is the only material which is quite generally applicable. In chemical works, on the other hand, glass, on account of its fragility, is rarely used, condensers therefore, wherever possible, are made of metal, usually fashioned into spirals ("worms") and set in tub-shaped refrigerators. Where acids have to be condensed, stones or worms are generally employed. In the distillation of acetone or phenol, worms, notwithstanding their high price, have been found to work best, and in the long run to be cheapest.

The theory and successful execution of the process assume their greatest simplicity when the substances to be separated differ so greatly in their volatility that, without appreciable error, one can be assumed to be non-volatile at the boiling point of the other. A good illustration of this special case is afforded by the customary process used for the purification of water. A natural sweet water may in general be assumed to consist of three parts—1st, water proper, which always forms something like 98 per cent. or more of the whole, 2d, non-volatile salts, 3d, gases. To obtain pure water from such material, we need only boil it in a distillation apparatus, as to raise from it dry steam, which steam when condensed yields water uncontaminated only with the gases. To expel these all that is necessary is to aguin boil it for a short time, the gases go off with the first portions of steam, so that the residue, when allowed to cool in absence of air, constitutes pure water. To pass to a less simple case, let us assume that the substance to be distilled is a solution of ether in water, and the object is the separation of those two bodies. Ether boils at 35° C., water at 100° C. The elastic force of saturated steam at 35° is 42 mm., $= \frac{100}{35} = \frac{1}{4}$th of an atmosphere. Assuming now the mixture to be distilled from a flask, what will go on? Neglecting for the sake of simplicity the small tension of the steam at 35°, we should expect that at first the ether would simply boil away, so to speak, from a bath of warm water at 35° C., that the vapour would be pure ether, and maintain that composition until all the ether had boiled off, then there would be a break—the temperature of the liquid would gradually rise to 100°, and the water then distil over in its turn. And so it is approximately, but not exactly. Our theory obviously neglects some important points. Water at 35° has a tension of $\frac{1}{4}$th atmosphere, ether of one atmosphere, hence the two tensions may be produced together should press with a force of $\frac{1}{4}$th atmosphere—in other words, the mixture should commence to boil at less than 35°. This, however (as in the majority of analogous cases), is NOT confirmed by experiment. The mixture commences to boil at a little above 35°, and the boiling point rises steadily as the proportion of ether in the liquid decreases. Now, a priori, we should presume that at every given moment the volumes of ether and water in the vapour should be, approximately at least, proportional to the respective vapour tensions at the temperature at which the mixture happens to boil. Thus, for instance, assuming at the first that the liquid boils at 40° C., when the two tensions are equal to 910 and 55 mm. respectively, the vapour will contain $\frac{910}{910+55} = 0.94$ of its volume of ether vapour, and 0.06 of its volume of saturated vapours together should press with a force of $\frac{1}{4}$th atmosphere, hence the two are made of metal, usually fashioned into spirals ("worms") and set in tub-shaped refrigerators. Where acids have to be condensed, stones or worms are generally employed. In the distillation of acetone or phenol, worms, notwithstanding their high price, have been found to work best, and in the long run to be cheapest.

A thermometer placed near the entrance end of the condenser will, of course, record lower than one plunged into the boiling liquid, because the vapour in rising undergoes partial condensation, and the thermometer being bedded with the condensed vapour will approximately indicate the
boiling point of that dew, i.e., of that which is just going over. The composition of the vapour as above given must not be confounded with the composition by weight of the distillate. To obtain the latter we must multiply each of the two volumes by the density of the respective vapour, or, what comes to the same thing, by its molecular weight as expressed by the chemical formula. In our case the vapour volume ratio

<table>
<thead>
<tr>
<th>Water</th>
<th>55</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other</td>
<td>90</td>
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corresponds to the weight ratio

55 x H₂O = 55 x 18 = 1
90 x C₇H₁₆O₆ = 010 x 74 = 75 nearly.

This consideration strips of its apparently anomalous character what we observe when vegetable substances containing essential oils are distilled with water, when we find that these oils, although boiling far above 100° C., go over with the first fractions of the water. Take the case of lemon oil, which boils at about 174° C. The molecular weight of the oil is 150 = C₁₀H₁₆O₆; its vapour pressure at 100° is 75 mm. Hence what goes over at first when lemon peel is distilled with water should contain oil and water in the proportion——

\[ \text{Vol of Lemons} : \text{Water} = 150 \times 75 : 18 \times 750 = 12 : 17 \] (nearly).

The oil, although the less volatile substance of the two, being present in small quantity, but finely diffused, is soon completely driven over. No doubt the latent heats of vaporization of the two constituents have something to do with the composition of the vapour formed, as the chance of every particle of the mixture to be vaporized is obviously the greater the less its latent heat of vaporization.

After what has been said it will be clear that in the distillation of a mixture of two substances of approximately equal molecular weight and latent heats of vaporization, supposing neither to predominate overwhelmingly over the other, the one with the lower boiling point will predominate in the early, and the other will gradually accumulate in the later, fractions of the distillate. And similarly with mixtures of three or more bodies. The further the respective boiling points are removed from one another the more complete a separation can be effected; but in no case is the separation perfect. It is, however, easily seen that the analytic effect of a distillation can be increased by causing the vapour, before it reaches the condenser, to undergo partial condensation, when naturally the less volatile parts chiefly will run back. This artifice is largely employed by chemists, technical as well as scientific. The simplest mode is to let the vapour ascend through a long, vertical tube before it reaches the condenser, and to distil so slowly that a sufficiently large fraction of the vapour originally formed fails to survive the ascent through the cooling influence of the atmosphere. A more effective method is to let the condensed vapour accumulate in a series of small receptacles inserted between flask and condenser, constructed so that the vapour cannot pass through the receptacles without bubbling through their liquid contents, and so that the liquid in the receptacles cannot rise above a certain level, the excess flowing back into the next lower receptacle or into the still. But the most effective method is to let the vapour ascend through a slanting condenser kept by means of a bath at a certain temperature, which is controlled so that the liquid in the flask will flow slowly, the distillation only just progresses and no more.

The general principles thus stated regarding fractional distillation are liable to not a few exceptions, of which the following may be cited as examples. A solution of one part of hydrochloric acid gas in four parts of water boils (constant) at 110° C.; i.e., 10° above the boiling point of water, although the acid constituent is an almost permanent gas. This, however, is easily explained; there can be no doubt that such an acid is a mixture of real hydrates, i.e., does not contain either free water or free hydrochloric acid.

A similar explanation applies to the case of aqueous oil of vitrual, which boils the further above 100° the stronger it is, although the vapour may be, and in the case of acids containing less than 64 per cent. of real and really is, pure steam. The following cases, however, can scarcely be disposed of by the assumption of the interference of chemical action. Propyl alcohol boils at 97° C., water at 100°; and yet a mixture of the two, as Pierre and Puchot found, when distilled always commences to boil at 88° 5 with formation of a distillate of the approximate composition C₄H₁₀O + 27.8H₂O, and this particular aqueous alcohol boils without apparent decomposition at 88° 3. Some time later Dittmar and Steuart made a precisely analogous observation with regard to aqueous allyl alcohol. A strong temptation exists to explain these anomalies by the assumption of definite hydrates in the aqueous alcohol, and this hypothesis would serve in the meantime were it not for the erroneous observation discovered by the two French chemists, that amyl alcohol and water (two liquids which do not mix), when distilled simultaneously out of the same retort, go over at a constant temperature less than 100°, and with formation of a distillate which, although it is not even a mixture, has a constant composition. The most natural explanation of these phenomena is to assume them to be owing, not to chemical action, but rather to an exceptional absence of chemical affinity between the two components of the mixture, which for once gives the physical forces fair play.

**Dry (destructive) distillation.**—Of the great number of chemical operations falling under this head, we can notice only those which are carried out industrially for the manufacture of useful products. Of such most important are those in which wood, coal, shale, and bones form the materials operated upon. But as these processes form so many important industries, which have all special articles devoted to them, we must confine ourselves here to summing up shortly the features common to all.

In all cases the "retorts" consist of iron or fire-clay semi-cylinders placed horizontally in a furnace and connected by iron pipes with refrigerators, and through these with gas-holders. Within these retorts the materials are brought up, more or less gradually, to a red heat, and is maintained until the formation of vapours practically ceases. Each of the materials named is a complex mixture of different chemical species. Wood consists mainly of cellulose and other carbonhydrates, i.e., bodies composed of carbon and the elements of water; in coal and shale the combustible part consists of compounds of carbon and hydrogen, or carbon, hydrogen, and oxygen, richer in carbon than the components of wood; bones consist of about half of incombustible and infusible phosphate of lime (bone earth) and half of organic matter, of which the greater part is gelatine (compounds of carbon, nitrogen, hydrogen, and oxygen), and the lesser part fat (compounds of carbon, hydrogen, and oxygen). The chemical decomposition in each case is highly complex. An infinite variety of products is invariably formed, which, however, always readily divide into three,—1st, a non-volatile residue, consisting of mineral matter and elementary carbon ("wood charcoal," "coal," etc.) which contains chemically combined nitrogen; 2d, a part condensable at ordinary temperatures which always readily separates into two distinct layers, viz.:—(a) an aqueous portion ("tar-water"), and (b) a semifluid, viscous,
The "tar-water" is one of the four products, of which the qualitative composition most directly depends on the nature of the material distilled. In the case of wood it has an acid reaction, from the presence in it of acetic acid, which is associated (amongst many other things) with acetone and methyl alcohol. In the case of coal it is alkaline, from ammonia, present as carbonate, sulphide, sulpho-carbamide, and in other forms. Alcohols and oxygenated acids are absent.

The "tar" is a complex mixture of carbon compounds, all combustible, but, although all directly derived from a vapour, not by any means all of them volatile (regarding the components, see Tar). The quantity and quality of the tar naturally depend on the kind of material used, but perhaps yet more on the mode in which the distillation is conducted. Thus, for instance, a coal tar produced at low temperature contains a considerable percentage of paraffins. If, on the other hand, the distillation is conducted at high temperature, the paraffins are almost absent, while the proportion of benzol and similar acids is remarkably increased. A similar remark applies to the gaseous portion, as will readily be understood when we say that all volatile tar constituents, when passed through red hot tubes, are decomposed with formation of hydrogen and gaseous hydrocarbons, which latter, again, when submitted to the same operation, are all liable to undergo dissociation into simpler compounds and association into more complex substances.

**DISTILLATION OF WATER.**—The continual interchange and circulation of water, between oceans and other great reservoirs of water on the one hand and dry land on the other, may be regarded as a process of distillation. Rain is thus a form of distilled water, and when it falls through the atmosphere it is found to possess the softness and freedom from dissolved salts characteristic of water artificially distilled. Rain water, however, absorbs a considerable proportion of air and some carbonic acid from the air, and also frequently contains ammonia, salts, and free acids.

Water of that purity which can be secured only by distillation is of indispensable value in many operations both of scientific and industrial chemistry. The apparatus and process for distilling ordinary water are very simple. The body of the still is made of copper, with a head and worm, or condensing apparatus, either of copper or tin. The first portion of the distillate brings over the gases dissolved in the water, ammonia, and other volatile impurities, and is consequently rejected, and scarcely two-fifths of the entire quantity of water can be with safety used as pure distilled water.

Among the innumerable schemes which have been proposed for the production of a potable fresh water from the salt water of the ocean, two or three dependent on simultaneous distillation and aeration have been found, in practice, to produce most satisfactory results. Of course the simple distillation of sea water, and the production thereby of a certain proportion of chemically fresh water, is a very simple problem; but it is found that water which is merely evaporated and recondensed has a very disagreeable unpremeditated colour, and a most repulsive flat taste, and it is only after long exposure to pure atmospheric air, with continued agitation, or repeated pouring from one vessel to another, that it becomes sufficiently aerated to lose its unpleasant taste and smell and become drinkable. The water, moreover, till it is saturated with gases, readily absorbs noxious vapours to which it may be exposed. For the successful preparation of potable water from sea water, therefore, the following conditions are essential—1st, aeration of the distilled product so that it may be immediately available for drinking purposes, 2d, economy of coal to obtain the maximum of water with the minimum expenditure of fuel, and 3d, simplicity of working parts, to secure the apparatus from breaking down, and enable unskilled attendants to work it with safety. Among the forms of apparatus which have most fully satisfied these conditions are the inventions of Dr Normandy and of Chaplin of Glasgow. While these have met with most acceptance in the United Kingdom, the apparatus of Rocher of Nantes, and that patented by Gallé and Maxime of Havre, have been highly appreciated by French maritime authorities.

Normandy's apparatus, while having nothing to be desired in point of economy of fuel and quality of water produced, is very complex in its structure, consisting of very numerous working parts, with elaborate arrangements of pipes, cocks, and other fittings. It is consequently expensive, and requires for its working the careful attention of an experienced workman. It consists of three essential parts, in addition to any convenient form of boiler from which steam is raised under a certain amount of pressure may be obtained. These parts are called respectively the evaporator, the condenser, and the refrigerator. These are all closed cylindrical vessels, perforated internally with sheaves of pipes, through which passes the steam generated percolates, condenses, and is aerated as explained below. The refrigerator is a horizontal vessel above which the condenser and the evaporator are placed in a vertical position. When the apparatus is in operation the refrigerator and condenser are filled with sea water, and a constant current is maintained which enters the refrigerator, passes upwards through the condenser, and is discharged by an overflow pipe at a level a little above the top of the condenser. The evaporator is filled only to about two-thirds of its height with water from the condenser, and the admission and regulation of its contents are governed by a stop-cock on the pipe connecting the two vessels. The vessels being so prepared, superheated steam is admitted by a pipe leading from the boiler into the top of the evaporator, and, passing through the sheaf of pipes immersed in water, is there condensed. The condensed water passes direct from the evaporator into the pipes of the refrigerator, in which it is cooled to the temperature of the surrounding sea water. Here then is produced pure distilled but non-aerated water, and the means by which it is aerated and rendered fit for immediate use may be now traced. The superheated steam in penetrating the pipes in the evaporator heats and vaporizes a portion of the water around them. The steam so generated passes into the sheaf of pipes in the condenser, in which, as already explained, a current of water is constantly rising and passing away by the overflow pipe. The condensation of the steam within the pipes, again, communicates a high temperature to the upper stratum of water in the condenser. As water at a temperature of 54° and 5° C parts with its dissolved air and carbonic acid gas, a stream of water is continually rising to the upper part of the condenser at a temperature more than sufficient to liberate these gases, and by means of a pipe these pass over into the upper part of the evaporator, and there mingle with and supersaturate the steam generated in that vessel. Instead, therefore, of it being simply steam which passes from the evaporator to the tubes of the condenser, it is a mixture of steam and gases, the latter being in sufficient quantity not only to supersaturate the steam with which they are mixed, but also fully to aerate the condensed steam which passed direct from the evaporator into the refrigerator. The super-aerated condensed steam passes from the evaporator into the condenser into those in the refrigerator, where it meets the...
D I S T I L L A T I O N

non-aerated water from the evaporator pipes, the course of which has already been traced. Here the two products mingle, cool, and pass outwards through a filter, may be drawn off as pure aerated water of excellent quality. In Dr Normandy’s apparatus the combustion of 1 lb of coal yields from 14 to 20 lb of potable water. The apparatus is extensively adopted in the British navy, the Cunard line, and many other important emigrant and mercantile lines.

Chaplin’s apparatus, which was invented and patented later, has also, since 1865, been sanctioned for use on emigrant, troop, and passenger vessels. The apparatus possesses the great merit of simplicity and compactness, in consequence of which it is comparatively cheap and not liable to derangement. In addition to a boiler for generating steam from sea water the apparatus consists of an aerator, a condenser, and a filter. The condenser is a cylinder, usually of cast iron with an internal worm pipe of copper, which is found to be the only really suitable metal for this use. The steam to be condensed is admitted to the worm by coal through the aerator. This part of the apparatus—the aerator—is really the essential feature in the invention, and consists simply of a series of holes perforated around the steam inlet pipe at the point where it enters the condenser. The steam passing down in a powerful jet draws with it through these holes a proportion of atmospheric air sufficient to properly sature the water for drinking purposes. The steam and air thoroughly commingled are together condensed as they pass through the coils of the worm,—cold sea water passing in to the condenser at its lowest end, and rising upwards and flowing away at the top. After passing through the filter placed directly under the condenser, the aerated water is delivered or stored ready for use, clear, bright, colourless, palatable, and devoid of odour, at a temperature of about 15° C. The cold sea water for condensing may be forced into the condenser by a special steam pump attached to the apparatus—a plan usually followed in sailing vessels—or any other convenient pumping arrangement may be resorted to. The steam for condensation is, in steamers, frequently supplied from the engine boilers; but generally it is preferable to employ a special small upright boiler, or to use the boilers attached to steam winches. Chaplin’s apparatus has been adopted by many important British and Continental shipping companies, among others by the Peninsular and Oriental, the Inman, the North German Lloyd, and the Hamburg American Companies.

Distillation of Spirits.—Notwithstanding the enormous scale on which this industry is now prosecuted, it is only in modern and comparatively recent times that it has attained to the important position which it now occupies. The art of separating alcoholic spirit from fermented liquors appears, however, to have been known in the far East from the most remote antiquity. It is supposed to have been first known to, and practised by, the Chinese, whence a knowledge of the art gradually travelled westward. A rude kind of still, which is still employed, has been used for obtaining ardent spirits in Ceylon from time immemorial. The name alcohol indicates that a knowledge of the method of preparing that substance probably came to Western Europe, like much more chemical knowledge, through the Arabs. Albucass, who lived in the 12th century, is spoken of as the first Western philosopher who taught the art of distillation as applied to the preparation of spirits, and in the 13th century Raymond Lully was not only well acquainted with the process, but also knew the method of concentrating it into what he denominated aqua viva, or spirit. At the time when Henry II—in the 12th century—invaded and conquered Ireland, the inhabitants were in the habit of making and using an alcoholic liquor—stewebagh (accepter-bres), water of earth abberated into whisky, which consequently is synonymous with the classical aqua viva. It is further a noticeable fact that Captain Cook found, among the inhabitants of the Pacific Islands discovered by him, a knowledge of the art of distilling spirit from alcoholic infusions.

The preparation of ardent spirit involves two separate series of operations,—1st, the making of an alcoholic solution by means of vinous fermentation; and 2d, the concentration of the alcoholic solution so obtained by the process of distillation and rectification.

All substances in nature which contain sugar in any of its forms are susceptible of undergoing vinous fermentation, and may therefore be used as sources of alcohol. Further, all starchy substances and ligneous tissue, seeing that by various chemical processes starch and cellulose may be converted into grape sugar, may also be used for the preparation of alcohol. It is thus obvious that the variety of organic substances, especially of the vegetable kingdom, from which alcohol may be elaborated is almost endless; and in practice it is found that the sources employed are very numerous. Commercially, distilled alcoholic liquors are manufactured of varying strength, or proportion of alcohol to water, according as the spirit is intended to be used for drinking purposes or for employment in the arts. The standard by which excess duty on alcoholic liquor is charged in Great Britain is proof spirit, in which the alcohol and water are in almost equal proportions by weight, there being in 100 parts 49 24 of absolute alcohol, and 50 76 of water. Distilled spirits are said to be “over proof” when the proportion of alcohol is greater, and “under proof” when there is more water present than is indicated by “proof.” Thus a spirit 11 over proof (o.p.) is a compound which requires the addition of 11 volumes of water to every hundred to reduce it to proof strength; and similarly 10 under proof (u.p.) indicates a liquor from every 100 gallons of which 10 gallons of water must be withdrawn to bring it to proof strength. Spirit for drinking is seldom sold at more than 11 over proof, from which it varies downward to 25 and more under proof. Run, however, is manufactured and imported as highly concentrated as from 10 to 43 over proof. Spirit of wines as used in the arts must be at least 43 over proof, and generally it is sold at from 54 to 64 over proof.

The alcoholic liquors enumerated below are those most commonly distilled for drinking or medicinal purposes. Brandy, when genuine, is a spirit chiefly distilled in France from wine. Rum is made from molasses or treacle, and is distilled in the West Indies, and generally in all countries where the sugar cane is cultivated. From fermented infusions of grain, malted and unmalted, and chiefly from barley, whisky is distilled, and that spirit when “silent” or flavourless is the basis of flavoured spirits, such as gin and fizzes, or British brandy. Arrack is an Oriental spirit distilled from “toddies,” or the fermented juice of various palm trees, and also from rice, which grows in the source of sake, the national spirit of the Japanese. Potato brandy is very extensively prepared from the fecula of potatoes in Germany and Russia, and is a spirit much used for fortiying wines, and for making fizzes, wine, as well as in the arts. Beet root, carrots, Jerusalem artichokes, and several other saccharine roots are also used for the distillation of spirit on a commercial scale. The only example of a spirit drawn from animal sources is the koumiss of the Tartars, which is distilled from the fermented milk of mares.

The modifications of stills or of distilling apparatus used in the preparation of alcoholic liquor are exceedingly numerous, and many of the later inventions are of most
complicated structure. The simple and primitive varieties of apparatus yield only a comparatively weak spirit on the first distillation, while the effect of the complex appliances now generally used to produce, in one operation, a highly concentrated spirit, and that with a great saving of fuel, time, and labour. All varieties of distillatory apparatus resolve themselves under these heads—1st, stills heated and worked by the direct application of the heat of a fire; 2d, stills worked by the action of steam blown direct into the alcoholic solution from a steam boiler; and 3d, stills heated by steam passing in coiled pipes through the alcoholic solutions to be acted upon.

To the first of these classes—still heated by direct fire—belong the earliest and simplest forms of distillatory apparatus; and for producing particular classes of alcoholic liquor, stills very simple in their construction are yet employed. The common still is a flat-bottomed, close vessel of copper, with a high head to prevent the fluid within boiling over. To the top of this head a tube is connected, which is carried in a spiral form round the inside of a tube or barrel (the condenser or refrigeratory), filled with cold water, and from its twisted form this tube receives the name of the "worm." The tube terminates at the bottom of the barrel, passing through it to the outside, and is conducted through the vessel termed the "nose" or "neck," the more commonly a vessel termed a "pot," being usually placed on the tube where it leaves the refrigeratory. In distilling with an apparatus of this simple construction, it is obvious that at the beginning of the operation, when the wash or liquid to be distilled is rich in alcohol, and its boiling point consequently low, the distillate will pass over at a low temperature and contain a high percentage of alcohol. But as the operation progresses, the boiling point of the mixture in the still rises, the heat has therefore to be forced, and the quantity of watery vapour which passes over with the alcohol is proportionately increased. As the wash or liquid in the still continually weakens, a point is arrived at when the value of the weak distillate produced will not balance the expenditure on fuel for maintaining the heat of distillation.

One of the earliest devices for economizing the heat of distillation consisted in interposing between the still and the refrigeratory a wash warmer, or vessel charged with liquid ready for distillation. Through this vessel the pipe conveying the hot vapours to the refrigeratory coil passed, and the vapours, partly condens’d there, heated up the wash, which was thus prepared to pass into the still at a higher and more elevated temperature. The "pot" stills, in which the markedly flavoured Irish whisky is made, are of this construction. In the great establishment of the Bankhead Distillery, Company, King's co., Ireland, simple stills of a capacity of 20,000 gallons are erected having a rousing apparatus within them to keep the wash in agitation so as to prevent solid particles from settling on the bottom and burning. Beyond a wash warmer or intermediate charger interposed between the still and the condenser, there is no other apparatus attached to the apparatus. The first distillate from the still is termed "low wines," and passes into the "low wines receiver," whence it passes into No. 1 "low wine still" to undergo a second distillation. The product of the second distillation, under the name of "faints or faints," is caught in the "faints receiver," from which it passes to No. 2 low wines still, and from this it is discharged as Irish whisky.

The introduction of another principle into distillatory apparatus is illustrated by Dorn's still, which was introduced into Germany in the early part of the century, and is yet much used in smaller establishments in that country. In that apparatus the vessel, of copper, interposed between the still and the condenser is divided horizontally into two unequal compartments by a diaphragm of copper. The upper and larger portion acts as a wash warmer (German, Vorwärmer), and through it the pipe from the still body coils, opening into the lower division. For a time the whole distillate condenses in this division, but as the temperature of the wash in the upper division rises, and the heat of the more watery distillate from the still also increases, the condensed liquor in the lower division in its turn begins to boil, and undergoes a second distillation or rectification, the vapours from it passing onwards to be condensed in the ordinary refrigerator. In many forms of distillatory apparatus two or more such rectifiers are placed between the primary still and the final condenser. The principle of the rectifier is easily understood. Supposing the operation of distilling to commence, the vapours which condense in rectifier No. 1 are much richer in alcohol than the liquid remaining in the still. The boiling point of the condensed liquid is consequently proportionately lower, and the vapour from the still passing into it gradually raises it to the boiling point, so that it is turned rectifier No. 1 and passed into rectifier No. 2 a liquid of still higher alcoholic richness. The relation of No. 2 to No. 1 is the same as that of No. 1 to the still body, and thus the concentration and redistillation might be carried on to any practicable or desired extent.

Another principle brought into play in complex stills for the separation of stronger from weaker alcoholic solutions consists of dephlegmation, or the sublimating of the vapour to a temperature so regulated that a portion of it, and that of course the most watery, is condensed and separated, running back into the still or into a special vessel, whilst the richly alcoholic vapour passes on to the rectifier or condenser. In Dorn's still the wide and lofty head attached acts as a dephlegmator, watery vapours condensing on it, and thence falling back into the body, but in the more recent forms of apparatus—such as those of Pistorius and Siemens—special dephlegmators of an elaborate nature are introduced.

Of the second class of stills—those in which the operation is conducted by the heat of steam generated in a boiler, and forced into the apparatus—the Coffey still may be taken as an example. It is the form most frequently adopted in Great Britain for the manufacture of "silent" spirit, and it is generally recognized as the best and most economical device for preparing a highly concentrated spirit in a single operation. The Coffey still may further be regarded as a combination of the continuous distilling apparatus of Hermann's patent, in its necessity for withdrawing exhausted solutions and recharging the still with fresh wash is avoided. Beginning, as the Coffey still does, with the steam of pure water, the principle of rectification formerly alluded to is here carried out from the first step. The watery vapour becomes more and more highly charged with alcoholic fumes, till in the end the strongest spirit falls, condensed, into the receiver. In Coffey's apparatus the wash is exposed in a number of shallow chambers, placed one over the other, to the vapour of steam, which, passing through the perforated bottoms of each chamber, and carried off with the alcoholic vapours into the condenser. This condenser also consists of a number of chambers separated from each other by perforated plates, and is so contrived that the cold wash passing in pipes through these chambers, in its way to feed the other series of chambers, acts as the condenser to the vapour of the alcohol, the wash being gradually heated thereby, as it passes through the successive chambers. The still, therefore, consists essentially of three separate but connected parts. The first is a large square receiver at the base, which receives the spent wash after it has been deprived of its alcohol by passing through the series of evaporating chambers; the second, a large, square, upright
box, termed an "analyzer," contains the series of evaporating chambers, each communicating with the one below by means of a valve tube, which allows fluid to escape from the upper to the lower chamber only, and having the dividing partition of each chamber perforated with fine apertures, to allow the steam which is admitted from below to pass from chamber to chamber through the shallow layer of wash of each. A safety or escape valve is also fitted to each chamber. The already heated wash enters the uppermost of these chambers in a continuous regulated stream, is gradually deprived of its alcohol by the steam as it passes from chamber to chamber, and at last escapes into the lower large receiver, from which it flows off after attaining a certain depth. The third part of the apparatus also consists of a square upright box, termed a "condenser," divided into compartments by means of finely perforated plates, and in each chamber is a tube of the tube which carries the cold wash onwards to supply the evaporating chambers just described. The alcoholic vapours escaping from the uppermost of the evaporating chambers are carried by pipes to the lowermost of those chambers, and are partly condensed by each successive chamber being colder than the one below it, in consequence of the wash entering the pipes from above, and only getting gradually heated by contact with the alcoholic vapour as it advances from chamber to chamber. As in the lowest of these chambers the heat is greatest, the alcoholic vapour or the condensed spirit contains a large amount of water; but as the chambers are successively cooler, the alcoholic vapour and condensed spirit at last arrive at a temperature only sufficient to convert spirit of the strength wished into vapour, and by an adaptation of valves, the substitution of an impervious partition for the perforated plate, and the admission of the alcoholic vapour into the chambers cooled by the passage of the cold wash in its contained pipes, that spirituous vapour or the condensed spirit is drawn off at one operation, of the very strength which it ought to have, and of the utmost purity.

Flat-bottomed and fire-heated stills are considered the best for the distillation of malt spirit, as by them the spirit is preserved. Coffey's still, on the other hand, is the best for the distillation of grain spirit, as by it a spirit is obtained almost entirely destitute of spirit, and of a strength varying from 52 to 70 over proof. Spirit is made of this high strength at a very low temperature that scarcely any of the volatile oils on which the peculiar flavour of spirits depends are evaporated with it, hence the reason why it is not adapted for the distillation of malt whisky, which requires a certain amount of these oils to give it its requisite flavour. The spirit produced by Coffey's still is, therefore, chiefly used for making gun and fusillade brandy by the rectifiers, or for being mixed with malt whiskies by the wholesale dealers.

As the preparation of alcoholic spirit is the most important industry in which the operation of distillation occupies a prominent place, the establishments in which the manufacture is conducted are known as distilleries. But there are many other important industries in which distillation is an essential feature, being in them employed either for the separation, purification, or concentration of various products. A large proportion of the essential oils are, for example, obtained by the distillation of the substances containing them from water or a mixture of salt and water. The treatment of other bodies in the distillation plays a part will be found under their respective headings. (W. D.—J. Pa.)

DISTRESS is one of the few cases in which the law still permits an injured person to take his remedy into his own hands. Other instances mentioned in the text-books are self-defense in the case of a personal assault, the replevin of property wrongfully taken away, the abatement of nuisances, &c. Distress differs from these as being a remedy for what is really a breach of contract, and it is the only case of the kind in which such a remedy is given. It is the right which the landlord has of seizing the personal chattels of the tenant for non-payment of rent. While damage facetum (and instruments of transport upon a neighbour's land) may also be distrained, i.e., may be detained until satisfaction be rendered for the injury they have done. The cattle or other animals thus distrained are a mere pledge in the hands of the injured person, who has only power to retain them until the owner appear to make satisfaction for the mischief they have done. Distress for rent was also at one time regarded as a mere pledge or security, but the remedy, having been found to be speedy and efficacious, was rendered more perfect by enactments allowing the thing taken to be sold. Blackstone notes that the law of distresses in this respect "has been greatly altered within a few years past." The legislature, in fact, converted an ancient right of personal redress into a powerful remedy for the exclusive benefit of a single class of creditors, viz., landlords. Now that the relation of landlord and tenant in England has come to be regarded as purely a matter of contract, the language of the law books seems to be angularly inappropriate. The defaulting tenant is a "wrong-doer," the landlord is the "injured party"; any attempt to defeat the landlord's remedy by carrying off distrainable goods is denounced as "fraudulent and knavish." The operation of the law has, as we shall point out, been mitigated in one important respect by a recent Act, but it still remains an almost unique specimen of one-sided legislation.

At common law distress was said to be incident to rent service, and by particular reservation to rent charges, but by 4 Geo II c. 28 it was extended to rent sack, rents of assise, and chief rents (see Rent). It is therefore a general remedy for rent certain in arrear. All personal chattels are distrainable with the following exceptions:—1. things in which there can be no property, as animals fera naturae, 2. things in actual use; 3. things delivered to a person following a public trade, as a horse sent to be shod, &c.; 4. things already in the custody of the law; 5. money, unless placed in a sealed bag, &c.; 6. things which cannot be restored in as good a plight as when distrained; 7. fixtures; 8. the proceeds of the land and instruments of a man's trade or profession. These exceptions, it will be seen, imply that the thing distrained is to be held as a pledge merely—not to be sold. They also imply that in general any chattels found on the land in question are to be available for the benefit of the landlord, whether they belong to the tenant or not. This principle worked with peculiar harshness in the case of lodgers, whose goods might be seized and sold for the payment of the rent due by their landlord to his superior landlord. Now, however, by the Lodgers' Goods Protection Act (34 and 35 Vict. c. 79), where a lodger's goods have been seized by the superior landlord, the lodger may serve him with a notice stating that the intermediate landlord has no interest in the property seized, that it is the property or in the lawful possession of the lodger, and setting forth the amount of the rent due by the lodger to his immediate landlord. On payment or tender of such rent the landlord cannot proceed with the distress against the goods in question. And originally in the case the landlord could only seize things actually on the premises, so that the remedy might be defeated by the things being taken away. But by 9 Anne c. 14, and 11 Geo II. c. 19, he may follow things fraudulently or clandestinely removed off the premises within thirty days after their removal, unless they have been in the meantime bona fide sold for a valuable consideration.
The subject specially discussed under the heading is
DISTRIBUTION

DISTRIBUTION OF LIFE, Animal and Vegetable, in
Space and Time.

As soon as we begin to examine into the distribution
of animals over the land surface of the globe, we
meet with two very distinct and sometimes con-
trasting classes of facts, which may be considered
groups as climatal and geographical distribution.
The first is the most obvious, and was long con-
sidered to be the most essential, since we find that not only many species, as the polar
bear and musk sheep, are strictly limited to cold
countries, and others, as the tapir, to warm, but
that entire groups, as the sheep on the one hand and
the tigrons on the other, seem almost equally dependent
temperature. But when we come to compare the produc-
tions of the several continents, we find a set of differences
in which climate appears to play no part. Thus, almost
the whole of the warblers (Sylidna) of Europe and North
Asia are absent in similar climates in North America, their
place being taken by a totally distinct family, the wood-
warblers (Mniotilus), the ant-eaters, sloths, and tapirs
of tropical America are replaced in tropical Africa by arid-
loins like Borneo and New Guinea, situated in the same
ocean not very far apart, and whose climates and physical
conditions are, as nearly as possible, identical, are yet as
radically different in their chief forms of animal life as are
remote countries situated respectively in the cold and tropi-
DISTRIBUTION

animal

eal zones. It is evident then, that although climate has a certain amount of influence on the distribution of animal forms, yet geographical conditions are far more important. There is reason to believe that the direct action of climate on animal life is far less effective than its indirect action through the limitation of the variety and quantity of vegetable and insect food; whereas geographical isolation has led to a diversity of type by its influence on development during successive ages, as pointed out by Mr Darwin (Origin of Species, 6th ed. p. 81, 83.) It follows that zoological regions, or those primary divisions of the earth characterized by distinct assemblages of animals, will, for the most part, coincide with natural geographical divisions. They do not, however, conform to the actual divisions of our geographies, because these are often political or ethnographical, rather than physical—as in the separation of Europe from Asia. In another case, the coincidence of a mountain chain (the Himalayas) and the plateau of Tibet, with barren mountains, the forms of life change in a manner somewhat analogous to the changes observed in passing from a warm to a cold country. This change is, however, far less observable in animals than in plants, and it is so unequal in its action, and can so frequently be traced to mere change of climate and deficiency of food, that it must rank as a phenomenon of secondary importance. Vertical distribution among animals will be found in most cases to affect species rather than generic or family groups, and to involve in each case a mass of local details which can hardly be introduced in a general sketch of the whole subject of distribution. The same remarks apply to the bathymetrical zones of marine life. Many groups are confined to tidal, or shallow, or deeper waters; but these differences of habit are hardly "geographical," but involve details, suited rather to the special study of individual groups than to such a general outline of the distribution of the animal kingdom as we are here attempting to lay before our readers.

Powers of Dispersal of Animals.—Animals differ greatly in their powers of dispersal or migration; and this is an important element in determining the causes of their actual distribution. Mammals as a class are more limited in this respect than birds; because the former have no means of passing over seas and oceans, or, with few exceptions, over lofty mountains or deserts, all of which when of moderate width can be easily traversed by many birds.

Reptiles in their adult state are almost as restricted in their powers of dispersal as mammals, but most of them being oviparous, their eggs may be floated and transported to a great extent in seas and ocean waters; or, even, in rare cases, be carried by birds; whereas the young of mammals are for some time wholly dependent on their parents. Amphibia and fresh-water fishes have yet another advantage, that many of them can endure great cold, and their eggs may sometimes be frozen without injury. Thus floating ice becomes an important agent in their dispersal, and enables us to account for the curious fact that their distribution often differs in a remarkable manner from that of the three higher classes of vertebrates. When we come to insects, we find the power of dispersal (as regards land animals) at a maximum; for not only can they travel by almost every mode available to other groups, but their small size, less specific gravity, and (in many cases) great tenacity of life, give them altogether exceptional advantages in this respect. They are easily carried for great distances through the air by gales and storms; and there is evidence to show that many wide-spread groups owe their extensive range to this cause. Others can live uninjured for many days at sea while their eggs or larvae, enclosed in crevices of tree-trunks or concealed under bark, may be carried for hundreds or even thousands of miles by surface currents across extensive seas (Wallace, Geographical Distribution of Animals, vol. 1, pp. 32, 209–214). The fact, then, that these small creatures have often a more extensive range, and present greater anomalies in their distribution, than larger animals, is only what we might expect; and if we keep their unusual powers of dispersal ever present to our minds, we shall be able to account for most of the anomalies they present, and thus bring them under the same general classification of the phenomena of distribution which is most serviceable in studying the history of the animal kingdom.

But the actual power of dispersal is by no means the only factor in determining the distribution of a species or a group. It is no use to bring a creature to a new country if it cannot live and maintain itself there. Whether it can so depends upon many causes. It may be incapable of adapting itself to a different climate, and generally to different physical conditions; it must be able to live upon whatever food it may find in its new abode; and, most important of all, it must be able to defend itself against new kinds of enemies and to live in successful competition with allied organisms which are already in possession of the soil.

Wide-spread and Local Groups.—There is much reason to believe that the last-mentioned condition is the most difficult for an intruder to fulfill, and that a large proportion of the immigrants which from any cause arrive in a new country, are unable to maintain themselves in it, not because the country itself is not well adapted to their wants, but solely because it is already occupied by other creatures somewhat better adapted to all the surrounding conditions. Hence arise the phenomena of wide-spread or dominant species, and others which are exceedingly local and often rare, that is, consisting of but a small group of individuals. The former are best adapted to the entire environment, and are generally increasing their numbers and area of distribution; the latter are less perfectly adapted, and probably diminishing in numbers and on the road to final extinction. The power of adaptation seems, generally speaking, to be in an inverse ratio to the power of dispersal. The larger mammals and many birds are capable of enduring a great variety of climates, and even of maintaining themselves in many new countries in competition with the native inhabitants. Thus horses and cattle from the Old World have run wild and greatly multiplied in both North and South America, and are probably capable of existing in any country where there is a sufficiency of open uncultivated land. Insects, on the other hand, are often dependent on some one kind of vegetable food, are especially liable to injuries by climate, and unless very numerous would be liable to be at once exterminated by their various enemies.

Barriers which Limit the Distribution of Animals.—These are of many kinds, and affect the several groups in unequal degrees. The nature of the vegetation alone determines the range of a number of animals. Deserts, marshes, open plains, and especially forests, have each their peculiar inhabitants which can hardly stray far beyond their limits. This is particularly the case with the tropical forests, whose perpetual foliage and almost perennial succession of flowers and fruits supply the wants of an immense number of peculiar forms of life. These forests are, in fact, the home...
of all that is most characteristic of the tropics, and their limits form the dividing lines between very distinct faunas. Rivers, when very large, also determine the range of many species, but this is probably because their valleys have been formed by or across the sea separating districts with something quite different faunas. Mountains, when rising to a great height in unbroken ranges, form an impassable barrier to many groups; but their geological age is also an important factor, and they are seldom so ancient and so continuous as to form absolute barriers. Climate, whether determined by latitude or by elevation above the sea, is also a very effective barrier, though probably its action is indirect, and is determined by its influence on vegetation, and by bringing diverse groups into competition. The limits of the tropical and temperate zones, generally marked out by more or less extensive deserts, form the boundary between regions or sub-regions all round the globe. Oceans are, however, by far the most important barriers; and this is due not only to their great extent and general impassability to land animals, but also to their enormous antiguity, so that for countless ages they have separated the faunas of remote continents from each other.

In accordance with these principles, it is found, that continents separated by the widest and deepest oceans differ most radically in the entire series of their animals, while those which are less completely separated, or which are only divided by climatal differences or by mountain ranges, are less unlike in their chief forms of life. Thus are constituted zoological regions, which represent the most permanent geographical features of the globe, and afford us an indication of that permanence in the isolation and peculiarity of their animal inhabitants.

Zoological Regions.—Although there is some difference of opinion as to the number and limits of the primary divisions of the earth termed regions, the following are now generally admitted to be the most satisfactory. They are nearly identical with those first proposed by Mr P. L. Sclater in 1857.

1. The Palaearctic Region, which includes all Europe to the Azores and Iceland, all temperate Asia from the high Himalayas and west of the Indus, with Japan, and China from Singtep to and north of the watershed of the Yang-tse-kiang; also North Africa and Arabia, to about the line of the tropic of Cancer. This may be popularly called the European region, Europe being the richest part of it and containing representatives of all the more important types; but it must not be forgotten that the region includes a much larger area in Asia, and that there are many peculiar North Asian animals.

2. The Ethiopian Region, which includes all Africa south of the tropic of Cancer, as well as the southern part of Arabia, with Madagascar and the adjacent islands. It may be popularly termed the African region.

3. The Oriental region, which is comparatively small, including India and Ceylon, the Indo-Chinese countries and southern China, and the Malay Archipelago as far as the Philippines, Borneo, and Java. It may be popularly called the South Asian or Indian region.

4. The Australian Region, which is composed of the remainder of the Malay Archipelago, Australia, New Zealand, and all the tropical islands of the Pacific, as far east as the Marquesas and the Low Archipelago.

5. The Neotropical Region, which comprises the whole of South America and the West Indies, and the tropical parts of Central America and Mexico. It may be well called the South American region.

6. The Nearctic region, which consists of all temperate and arctic North America, with Greenland, and is thus well described as the North American region.

These six regions, although all of primary importance from their extent, and well marked by their total assemblages of species, vary greatly in their zoological richness, their degree of isolation, and their relationship to each other. The Australian region is the most peculiar and the most isolated, but it is comparatively small, and poor in the higher animals. The Neotropical region comes next in peculiarity and isolation, but it is extensive and excessively rich in all forms of life. The Ethiopian and Oriental regions are also very rich, but they have much in common. The Palaearctic and Nearctic regions, being wholly temperate, are less rich, and they too have many resemblances to each other; but while the Nearctic region has many groups in common with the Neotropical, the Palaearctic is closely connected with the Oriental and Ethiopian regions. The cause of these various resemblances and differences depends on the past history of the earth, and will be better understood when we have sketched the zoological features of each region and the changes they have undergone in the latest geological periods.

1. The Palaearctic Region.—This extensive region, though varied in physical aspect, and often covered with luxuriant vegetation, is poor in animal life when compared with the great tropical regions of the Old and New Worlds. This is no doubt due mainly to climate, but also in part to so much of its surface being densely populated and highly cultivated. It contains, however, a number of characteristic and not a few altogether peculiar animals. Beginning with the Mammalia, we have first the sheep and goats with such allied forms as the chamois and saiga-antelope, which are especially characteristic, deer are abundant and varied, the smaller cats, the wolves, the foxes, and the bears abound, with a variety of smaller groups, as weasels, badgers, and some others. Seals are plentiful on the northern coast, and even in the Black and Caspian Seas, wild horses and asses abound in Asia, as they once did in Europe, there are many peculiar forms of mice, voles, and hamsters, while dormice, squirrels, marmots, hares, and pikas are well-marked features of the region. The insectivorous family of the moles is almost peculiar, as are the curious mole-rats (Spalax). The genera which are peculiar to the Palaearctic region belong to the following families — to the moles (Talpidae) 7 genera; to the dogs (Canidae) 1 genus, to the weasels (Mustelidae) 3 genera, to the pumas (Elaphidae) 1 genus, to the seals (Phocidae) 1 genus, to the camels (Camelidae) 1 genus, to the deer (Cervidae) 6 genera; to the hollow-horned runnights (Bovidae) 7 genera, to the musk (Moschidae) 1 genus, to the mole-rats (Spalacidae) 2 genera, to the gerbils (Gerbillidae) 1 genus, to the agoutis (Agoutidae) 4 genera, and the chinchillas (Chinchillidae) 1 genus.

In birds, the Palaearctic region is pre-eminently rich in thrushes, warblers, titmice, jays and magpies, sparrows, and buntings. It also abounds in grouse, and in its eastern half in magnificent pheasants. Water-birds are plentiful, and its northern districts produce many true ducks and divers. The following enumeration of the families of which the Palaearctic region possesses peculiar genera will help to give an idea of the characteristic features of its ornithology. — Of the waterfowls (Syntidae) 13 genera, many of which, however, migrate into tropical Africa and Asia in winter, of babblers (Timaliidae) 1 genus, of reedlings (Pinaridae) 4 genera; of creepers (Certhiidae) 1 genus, of tits (Paridae) 1 genus; of the crow family (Corvidae) 4 genera, of finches and buntings (Fringillidae) 12 genera, of starlings (Sturnidae) 1 genus, of larks (Alaudidae) 2 genera; of sand-grouse (Pteroclidae) 1 genus, of grouse (Tetraonidae) 4 genera; of pelicans (Pelecanidae) 5 genera; of vultures (Vulturidae) 1 genus, of rails (Rallidae) 1 genus, of snipes (Scolopacidae) 4 genera, of curlews (Charadridae) 1 genus; of bustards (Otididae) 1 genus.

Of the remaining groups less accurate information is obtainable, and their distribution is less generally interesting. Reptiles, being heat-loving animals, are comparatively scarce, yet in the desert regions they are more plentiful and furnish a considerable number of peculiar types, there
being two genera of snakes and four of lizards not found in any other region. All reptiles diminish rapidly as we go north, and cease before we reach the Arctic circle. The common viper reaches 67° N. lat. in Scandinavia, the northern limit of reptiles in the region. Amphibias are much more patent of cold, the common frog ranging to the extreme north of Europe. There are no less than ten peculiar genera of Amphibias, 8 of the tainted and 8 of the tailless group, the most remarkable being the Proteus, found only in subterranean lakes in Carniola and Carinthia.

Of fresh-water fishes about 20 genera are wholly confined to the region, of which the perches (Percidea) have 3 genera; the salmons and trout (Salmonidea) 3 genera; the carp (Cyprinidea) 13 genera; with a peculiar genus and family (Comephorus) found in Lake Baikal, and another (Tetla) belonging to the Cyprinodontae, in the Atlas Mountains.

Insects are so extensive a class that the barest enumeration of their most numerous forms would be out of the question in such a sketch as this. We can only mention that, although butterflies are not very numerous, yet no less than 15 genera are peculiar to the region. Bees, however, abundant, and the most characteristic Palearctic group is undoubtedly the Carabidae, or productive ground-beetles, which are more predominant here than in any other region, and are also of larger average size—a most unusual circumstance in the insects of a temperate as compared with those of tropical regions.

Land shells are tolerably numerous both in species and individuals, but are of small size and little beauty as compared with those of warmer countries. Very few of the genera are peculiar.

The total number of the generic forms of Vertebrata peculiar to the Palearctic region is, as nearly as can be estimated, 138,—a very large number when we consider the general severity of the winter, and the circumstance that along the whole southern margin this region is bounded by tropical lands with no absolute barrier against immigration. The amount of peculiarity may be even better estimated by the fact that, out of a total of 274 genera of Mammalia and birds inhabiting the region, 87, or somewhat less than one-third, are confined to it. This mode of estimating the zoological character of a region by genera, gives a far truer view than any enumeration of peculiar species, because the former imply more radical and important differences than the latter.

Subdivisions of the Palearctic Region.—The general zoological characters here given apply with considerable uniformity to the whole of the Palearctic region, the similarities being of course greater where climate and physical conditions generally correspond. Thus, even between such remote islands as Great Britain and Yesso (North Japan) there is a wonderful similarity in the general forms of life, many of our most familiar birds and insects reappearing at the other extremity of the region under identical or but slightly modified forms. Owing perhaps to the great climatic changes the north temperate zone has undergone in recent geological times, and the vast amount of migration thereby produced, as well as the absence of any continuous barriers, it is very difficult to mark out with accuracy the zoological subdivisions of this region. Certain broad divisions, depending partly on climate, partly on physical features, and partly on geographical proximity to other regions, may, however, be indicated. East and north of the Pyrenees, Alps, Balkans, and Caucasus, may perhaps be considered as the most typical portion of the Palearctic region, possessing most of its characteristic features in their full development. It may be termed the European sub-region. South of this comes the Mediterranean sub-region, including South Europe and North Africa, which wonderfully resemble each other in all their forms of animal life, although some few peculiar species are found south of the Mediterranean. This sub-region includes also Asia Minor and Persia, with Syria and Northern Arabia. It is chiefly characterized by a number of desert birds such as gazelles, cacti, jerboa, quails, desert-larks, and numerous hawks, and by a number of species which cannot endure the colder climate of the north, as pergonuses, monkeys, lophiomma, and a host of peculiar groups of insects. To this region belong the Atlantic islands from the Azores to the Canaries, the animal productions of all of them being closely related to those of South Europe and North Africa. It is a curious fact that the remotest of these islands, the Azores, offer less peculiarity in their birds and insects than Madeira and the Canaries, which are so much nearer the continent; but this is sufficiently explained by the prevalence of storms and gales in the more northern latitudes of the Azores, and helps to prove that casual currents are the chief means by which these two classes of animals are dispersed. For a discussion of this interesting subject and its bearing on the theories of distribution and development, see Wallace, Geographical Distribution of Animals, vol. 1, p. 206.

The northern part of Asia differs very little in the main features of its zoology from the corresponding parts of Europe, but as we approach the northern slopes of the great plateaus of Central Asia, many peculiar forms occur, as wild hogs, pikas (Lagomys), strolling of the genus Podoce, and many others. The great desert plateau, that of Central Asia, is bounded by the Altis and Mongols forming barren subdivisions, with many peculiar forms. Here are found the yaks, some peculiar antelopes, with wild sheep and goats, and several peculiar rodents, and among birds many peculiar forms of grouse, partridges, and pheasants.

Another well-marked division is formed by the temperate portions of Eastern Asia, comprising Japan, Manchuria, Northern and Central China, with parts of East Asia, and the regions of the Himalayas as far west as Nepal. This is a fertile and luxuriant district which receives several tropical forms of life from the adjoining Oriental region. It is rich in Insectors and in deer, and has a form of musk being a common small wild dog (Nydererat), and even several peculiar species of the monkey tribe. It is also pre-eminent in the number of the bestial looking species. The Manchurian sub-region has thus a very beautiful and varied fauna, but the intermingling of Oriental types, and the uncertainty of its southern boundary, renders it less characteristically Palearctic than the European sub-regions.

II. The Ethiopian Region.—This region is much less extensive than the last, but being almost wholly tropical it presents a richer and more varied assemblage of animals. Its southern extremity, although really extra-tropical, is yet so warm and so little subject to extremes of temperature that the growth of vegetation and the corresponding development of animal life are scarcely diminished, and the southern extremity may be said of the elevated interior of the continent. As Madagascar is quite isolated and its productions very peculiar, it will be best first to sketch the main features of African zoology, which are tolerably well marked and homogeneous.

The African continent is pre-eminent in the number of large mammals. It possesses an abundance of representatives of several species, gratia (now peculiar to it), giraffes, and baboons—the largest of the ape tribe, a host of large and remarkable antelopes, the huge hippopotamus, several species of zebras, wild buffaloes, several remarkable forms of swine, and an abundance of hounds, leopards, and hyenas, forming together an assemblage of large and highly organized animals such as occur nowhere else upon the globe. There are also many smaller, but very remarkable forms. There are 7 peculiar genera of apes, 3 of lemurs, 5 of insectors, 12 of Oyerudiae, the remarkable Proteus forming a distinct family allied to hyenas and weasels, 2 of Canidae, 2 of Mustela, 2 of Suidz, 1 of Pteropod, 12 of Bondioidea, and the host families of Rodents, and the curious archivist (Oycteropodes), forming a distinct family of Edentata.

In birds Africa is not so peculiar, yet it has many remarkable groups. Such are the pheasant-eaters (Menopagidae), the colies (Colidae), the secretary-birds (Serpentariidae), the ground hawks, and the guinea-fowl, all of which are peculiar. It abounds in ant and fly catchers, shrikes, sun-birds, weaver-birds, starlings, larks, barbets, grouse, and hawks,—more than half the genera of land-birds being peculiar, and, if we include those of Madagascar, nearly two-thirds.

Reptiles abound, there being three peculiar families of snakes and one of lizards; and there is one peculiar family
and a northern belt from Senegalum through Lake Chad to Abyssinia, while it extends to the Atlantic coast from Angola to Luapula Land. This extensive district may doubtless be further subdivided, but it exhibits throughout the main features of Central African zoology as distinct from that of West and South Africa. Its zoological characters are negative rather than positive, as it has very few peculiar groups of animals, and yet a great variety of animals is abundant, and a greater variety of antelopes are found here than in the other sub-regions.

The West African or forest sub-region extends from the Gambia to the Congo, and inland to the sources of the Nile and the western watershed of the great lakes. It is characterized generally by a luxuriant forest vegetation, and it possesses many peculiar animal forms. Here we find the gorillas and chimpanzees, a great variety of monkeys, and two peculiar genera of lemurs, as well as some remarkable genera of Insectivora, Vespertilia, and Tragulidae. It is the home of the three species of Pinnipedia, the typical plantain-eaters (Mamphixyus), one of the Eastern group of ground-thieves (Eutrephis), and many peculiar genera of passerine birds.

The South African or extra-tropical sub-region, though quite open to the central districts and to a large extent overrun with the same fauna, yet presents so many peculiarities as to indicate, probably, a former southward extension. We have 3 peculiar genera of Insectivora, the remarkable Phalera, peculiar to Cape Canoe and Mantelula, many peculiar rodents, including Oryxus (one of the mouse-rats), Pelliturus (one of the spring-rats), and Pides (the Cape-hare). There are also some peculiar genera of birds, among which are 4 genera of bustards, 2 of sun-birds, 2 of Starlings, 3 of Rails, and a curious woodpecker (Procopturus). Reptiles are still more peculiar, there being 7 peculiar genera of butterflies, and a host of beetles which are either quite peculiar or have their nearest allies in Madagascar, in India, or America. This remarkable and related fauna must be considered, in connection with the wonderful Cape flora, so much richer and more isolated than that of any other part of Africa—as indicating important changes in the past history of this part of the globe.

III. The Oriental Region—The Oriental region is wholly tropical, but is of smaller extent than the Ethiopian. It is very largely covered with forest-vegetation, and is much broken up into islands and peninsulas, conditions so favourable to animal life as fully to compensate for its smaller area.

In the larger Malaya there are many resemblances between the Oriental and Ethiopian regions. Both have anthropoid apes, elephants, rhinoceroses, large felines, and an abundance of crows. But the Oriental region abounds in deer and bears, it has many remarkable Insectivora, the Malay tapir, and many wild cattle. It has also a great number of characteristic forms of life. It has 6 peculiar genera of apes, and 3 of lemmings, 5 of Insectivora, among which are two peculiar families, Glosmahatheridae and Tupidae, 12 of Vespertilia, 1 of Canide, 5 of Mantelula, 2 of Oryxus, 1 of Tragulidae, 1 of Cuvu, 4 of Bovidae, and 5 of Rodents.

The birds of this region are exceedingly abundant, varied, and remarkable. Among them are 3 peculiar families of passerine birds—the hill-babbler (Leuthocichla), the green bulbuls (Psilomithridae), and the gapem (Eurytomidae), while the babblers (Piplidae), the fruit-thrushes (Pycnonotidae), and the king-crows (Decurvidae) are far more abundant than in the adjacent regions. Turtles, crayfishers, crocodiles, sun-birds, starlings, pigeons, and pheasants are also very abundant, and are represented by many remarkable forms. More than 240 genera of land-birds inhabit the region, of which number 165 are peculiar to it. Reptiles are very abundant. There are 5 peculiar families of snakes peculiar to the region, and there is a large number of peculiar genera both of snakes and lizards.

Insects are exceedingly varied and beautiful, especially in the Himalayas and in the Malay islands. Among butterflies the Danaus are very abundant, while the true Papilionas are perhaps finer than in any other part of the...
DISTRIBUTION

About bees the Lecanidae, Cetonidae, and Bu- 
prestidae are especially remarkable, while the elegant Longi- 
dorns have their full quota of curious and beautiful forms.

Subdivisions of the Oriental Region.—These are tolerably well 
marked, though very unequal in extent and productiveness. The 
Himalayan slopes with all the Indo-Chinese countries form the 
chief and most typical part of the region. Here are the greatest 
variety of Mammals and birds, and almost all the more important 
groups are represented. These genera of Mammalia and 46 or birds 
are peculiar to this sub-region.

The Malay Peninsula, with the larger Malay islands, as far as Java, 
Borneo, and the Philippine Islands, form a sub-region which has much 
in common with the last, and is not almost equally rich, and peculiar 
groups even richer and more peculiar. Thus it has no less than 14 
genera of Mammals and more than 40 genera of birds which are 
wholly peculiar to it, among which are such interesting forms as 
the crang-utans (Simus), the spectre-lemur (Yamuran), the fly- 
glumers (Galantiumus), the feather-tailed tupas (Pulicoerus), the 
sun-bears (Helarctos), and the magnificently-plumed argus-pheasants. 
About an equal number of genera are common to the Malayan and 
the Indo-Chinese sub-regions, but are not found elsewhere, so that 
the two have much in common, and together comprise nearly all 
that is most remarkable and beautiful of the Oriental fauna.

The other sub-regions consist of the Peninsula of India and 
Ceylon. Their chief feature is their comparative zoological 
poverty, yet they possess a greater number of the land-living sub-
regions, extending from the foot of the Himalayas to the Carlsbad, 
we find that extensive and fertile region, though abounding in life 
of every varietal group of either Mammals or birds, while, favoured by the open and arid plains of which much 
of the surface consists, some African types are more abundant than 
in other parts of the region, though these are numerically unim-
portant.

Ceylon and Southern India are somewhat more interesting, as 
they possess some peculiar forms, and others in common with the 
Malay islands. Among the former is Loris, a peculiar lemur; and 
there is a peculiar genus of Muridus, as well as one or two peculiar 
genera of birds. There are also several peculiar species of monkeys, 
and the Malayan genus Tupaca, while among birds we find 
Malayan forms of cockatoos and Timanduda. The reptiles, however, 
best characterize this sub-region, for they possess an entirely peculiar 
family of snakes (Uropeltis), consisting of 5 genera and 38 species, 
as well as 4 other peculiar genera of snakes. There are also many 
peculiar genera of lizards belonging to the Agamidae and Acontidae, 
and 3 peculiar genera of tailless Batrachia. The insects also offer 
some remarkable cases of Malayan affinity, the genus Hestia (or 
spectra-butterflies) being found in Ceylon only beyond the Malay 
islands; while 6 genera of Malayan Longicornos and the wingless 
Tremoglypha belonging to the Cysticinae, are in the same category. 
The combination of so many peculiarities justifies the separation 
of Ceylon and a portion of Southern India as a distinct Oriental 
sub-region.

IV. The Australian Region.—On entering this region we meet 
with such a radical change in all the higher forms of life that the 
zoologist seems to have got into a new world. Even the Anato-Malay 
islands, though differing in no way in climate or luxuriance of vegetation from the Indo-Malay 
islands to the west of them, exhibit this change in an 
almost equally marked degree. With the exception of 
Celebes, which is a debatable land hardly belonging to 
either region, the other islands only possess a few 
notable differences in the frugivorous mammals—the bird 
which can traverse the ocean, and the smallest forms of 
rabbits, the mice—which may be occasionally carried by 
floating trees or other accidental means across narrow 
arms of the sea. There are 5 distinct families and 33 genera of 
Australian Marsupials, as well as 2 families and genera of 
the peculiarly-organized Monotremata which comprise the 
notorious Ornithorhynchus and Echidna.

Birds, as might be expected, are not so excessively peculiar, a large number of almost cosmopolitan families 
extended into Australia; yet there are no less than 16 
families altogether characteristic of the region, among which 
are such remarkable forms as the Paradise-birds (Paradi-
siae), the honey-suckers (Meliphagidae), the lyre-birds 
(Limodiura), the cockatoos (Cacatua) the bower-birds 
(Trochilidae), the mound builders (Megopodidae), and the cesso-
waries (Casurinidae) Among the important groups which are 
entirely wanting in Australia are the barbets (Megalaimidae), 
the woodpeckers (Picidae, otherwise cosmopolitan), the 
trogons (Trogonidae), and the pheasants (Phasianidae). The 
birds, as in most other cases, are far more abundant 
than the birds; but a large proportion of the genera 
are peculiar, and there are even 3 peculiar families of 
zizards, as well as the singular Various, which 
constitutes not only a separate family but a new 
order of reptiles. The Amphibians and fresh-water fishes 
present a corresponding amount of peculiarity; and 
the recent discovery of the genus Ceratodus (the mud-fish) 

is very interesting, since its nearest allies appear to have 
lived already in the Secondary period, while other members 
of the same group are found isolated in the rivers 
of tropical Africa and America.

Insects are very abundant in Australia and the Aus-

tro-Malay islands; but owing to the various means by which 
these small creatures are conveyed across the seas, and the 
identity of physical conditions in the Oriental and Australian 
regions of the archipelago, the true Australian fauna is chiefly 
developed in Australia itself, where there are a considerable number of peculiar genera in all orders 
of insects.

Subdivisions of the Australian Region.—Besides the Australian 
continent, which is by far the richest and most important part 
of the region, there are three groups of islands which have each some 
distinctive peculiarities. These are the Austro-Malay islands, 
comprising New Guinea, the Molucceas, and the Timor group; 
the New Zealand, and the New Caledonian regions. These 
first is very rich, especially in birds and insects while the other two are exceedingly 
poor.

The Austro-Malay sub-region, of which New Guinea is the central mass, is comparatively poor in Mammals, only 9 genera of 
neusupaia being yet known, 8 of them being peculiar, with pigs, a few mice, and some deer (perhaps introduced) in the Molucceas. 
Birds are far more numerous, the Paradise birds and the true 
crimson lorises being peculiar to the sub-region, while more than 40 
genera of land-birds are confined to it. It is exceptionally rich in peculiar 
forms of flycatchers, honey-suckers, kingfishers, cockatoos, and 
pigeons, and its birds are generally characterized by a 

deadliness of plumage far exceeding that which prevails in the sur-
rounding regions. The insects exhibit a similar lack of the lus-

test butterflies and beetles in the world belonging to this 
sub-region.

As we pass east of the Solomon Islands we enter upon one of 
the poorest zoological regions in the world in proportion to 
its extent and luxuriant vegetation, the only exception to this 
being in the land-shells, which are very largely developed and very 
peculiar. Indigenous Mammalia are wholly wanting. Birds are 
very scarce, no more than about 150 species being known from the 
numerous islands scattered over 5000 miles of the Pacific, while 
these are only about a dozen peculiar genera. Reptiles are much 
more numerous than might be expected, considering the wide extent of 
sea separating many of the islands. There are 14 genera of lizards, 
of which 6 are peculiar, but few extend eastward of the Samoan Islands. 
Snakes are much less abundant, and none are found east of the 
Fiji Islands. Insects are exceedingly scarce, and of little interest.

The New Zealand group, though situated beyond the tropics and very remote from other lands, yet possesses a more ample and more 
interesting fauna. If we except two bats, mammals are wanting; 
but birds are tolerably abundant, and are very peculiar and in-
teresting. There are 34 genera of land-birds, of which 16 are 
peculiar. Twelve of these are passerine birds, chiefly Meliphagidae 
and Estrildidae. Sturnidae, with Newer and Norfolk peculiar. 

The extraordinary Limns, which has been alluded to above, is also a 
new frog belonging to a peculiar genus. There are some interesting 
fishes belonging to the Salmonidae, a family occurring elsewhere in the southern hemisphere; and there are several species allied to North American fishes.

Insects are very few, and generally of small size and insouci-

ous colours. Many of them are peculiar, but they have few 
extravagant affinities with Australian groups, or with those from 
the Oriental region.
V. The Neotropical Region.—This is in some respects the richest zoological region on the globe, yet it has certain resemblances to the Australian region, which is the poorest, and which it follows in natural order. This is owing to both being inhabited mainly by low types of Mammalia and birds, some of which have been preserved from early geological times, the Marsupials being a good example. But there has also been some intermigration between south temperate America and Australia, by means of intermediate islands and floating ice, and this has led to a community of forms in a few groups to which such a mode of transmission was possible.

The Mammalia are as abundant and varied as in any other countries except Africa and tropical Asia, but the region is characterized by poverty in the more highly organized forms, with a corresponding abundance of lower types. Monkeys are abundant, but all belong to two peculiar families—Cebidae and Hapalidae—different in structure and of a somewhat lower organization than those of the Old World. The deer, or nearly so, food, are not only unsurpassed but altogether unequalled by all the more characteristic American lizards. There are also 4 peculiar families of tailless Marsupials, the most popularly known being the *Pipidae*, which contains the remarkable Bunyamwede.

Fresh-water fishes are probably more abundant and varied than in any other region. Three entire families and several sub-family groups are peculiar, and the numerous forest-bordered rivers and extensive tracts of annually flooded woodland have led to the development of special groups of fruit-eating fishes, which, as articles of food, are not only unsurpassed but altogether unequalled in any other part of the globe. Fresh-water rays (Ptygonidae) and electric eels (Gymnotidae) are also peculiar to the Neotropical region; and there are an immense variety of Siluridae, Characidae, and Cyprinodontidae. It is reported that Professor Agassiz obtained more than a thousand species of fishes in the Amazon alone, but, although this may be exaggeration, there is no doubt that a still greater number exists in that wonderful river and its tributaries. The insects of tropical America are so innumerable in their variety, and so wonderful in their beauty, that it is hopeless to attempt to give an adequate idea of them. The butterflies are far more abundant and more gorgeous than in any other region, and their variety may be imagined from the fact that the peculiar genera are nearly equal in number to those of the rest of the world. The beetles, though very abundant, are not so clearly preponderant over those of all other regions. The stag-beetles (*Lucanidae*) and rose-chafers (*Cetoniidae*) are somewhat poorly developed; but all the other large families are very abundant, and comprise many forms of extreme beauty and interest. Such are the genera *Agra* among Carabidae, *Pyrodes* among Longicorn, and *Entimus* among Curculionidae. Land-shells equally surpass those of all other regions, but this is owing to the exceptional richness of the West Indian islands, the continent of America being by no means extraordinarily rich in this class of animals.

Other results of the Neotropical Region. —The manner in which this region may be most naturally and conveniently divided for physiological purposes is doubtful; but it is well known that South America (excluding only the higher Andes south of Chum-borah and the dry plain to the west) forms a compact area in which all the more characteristic American animals are developed in their highest luxuriance. This, however, falls nat
rally into three subdivisions, which may be generally indicated as Guiana, Brazil, and the Eastern Andes, each of which is characterized by a peculiar number of peculiar genera and types. These three areas are considered by Professor Newton (in his article Birds in this work) to be sub-regions, each equivalent to the whole of South America, and to the tropical part of North America, which may be termed the Mexican sub-region. But each of these latter may be also divided. Some temperate America consists of a western, or mountain, division, with many distinct groups, while the southern parts of Central America differ greatly from the northern, and all these subdivision may be considered as provinces of the respective sub-regions. It seems better, therefore, for the purposes of such a general sketch as the present, to consider the tropical parts of South America, as above limited, to be one sub-region, characterized by possessing a large proportion of the animal forms of the whole region. It will therefore only be necessary to indicate in what way the other sub-regions differ from this.

The Chilian sub-region, or temperate South America as above defined, is well characterized by its exclusive possession of the family of the Chonitisidae (comprising three genera) and the genus Anriilus (the llamas and alpacas), the only representatives of the Camelidae in the New World. It also has a peculiar form of bear, several peculiar genera of rodents, and two peculiar forms of arnu­diles. Among birds it has the curious plant-cutter (Phytagomidae), a peculiar family of waders (Thaumacordas), about 26 peculiar genera of passerine birds—1 of parrots, 3 of pigeons, and 2 of tinamous—it also possesses the American ostriches (Eoan), and 3 peculiar genera of plovers. The reptiles are usually of tropical genera, but a few are peculiar. Many of the fresh-water fishes are of peculiar genera; there are some Australian forms, and even one species (Oligodon attenuatus) is common to New Zealand, Tasmania, and Patagonia.

Among insects alone we meet with indications of a decided affinity for forms of the north temperate zone. There are several butterflies allied to Bresida, an Arctic genus, and others belonging to the temperate genera Hesperus, Argynnis, and Odax. The mass of the butterflies, however, are purely Neotropical. Of the beetles some are Australian, but the majority are allied to Neotropical forms; yet among the Cerambycidae, or carniverous ground-beetles, there are many truly northern genera, such as Carabus, Anthocerus, Trechus, &c., whose presence supports the theory of a migration along the American front to the northern hemisphere. (See Wallace's Geographical Distribution of Animals, vol. ii. pp. 44–46.)

In tropical North America, or the Mexican sub-region, we find far less peculiarity. The southern portion from Panama to Nica­ragua can hardly be separated zoologically from the adjacent parts of South America, while further north the chief difference consists in the absence of many typical Neotropical groups, and in the appearance of a few which more especially characterize the Nearctic region. In this form of the scale (Elasmomorpha) inhabiting the Nearctic region, with one or two peculiar genera of rodents; while such northern forms as Serre, Vulpes, Lepus, and Pampys are range as far south as Central America. Birds are more especially characterized, for the sub-region possesses no less than 37 peculiar genera of land birds, but many Neotropical genera are absent. The most im­portant of these are the Pteroptochidae, and the fami­lies Furnivarena, Conopaghnna, and Rupirodon, as well as most of the peculiar groups of waders. In place of these are found the crakes (Rallidae), warblings (Amipridae), and the tuckeys (Phousanidae) from the North. The fresh-water fishes as well as the insects are almost wholly Neotropical in character, but exhibit a considerable amount of peculiarity.

There remains the Western Islands or the Antillean sub­region, which in the amount of isolation and peculiarity it exhibits is better marked than any other part of the region. The Mammals are few but very interesting, as is usually the case in islands separated from continents by very deep sea. There are no monkeys, Cauveru, Uugulata, or Eudatra, the only orders represented being the Insectivora and the Rodents. The former, which is unknown in South America, is here represented by a peculiar genus, Solenodon, belonging to a family, Cretidae, only found elsewhere in Madagascar. The Rodents consist of two very peculiar genera, Cepropus and Plagudonta belonging to a family which is especially characterized, with a peculiar mouse, and an agent (Diplo­prodos) in the lesser Antilles. The birds are far more abundant than 200 resident species being known, besides a large number of migrants from the United States. These belong to 85 genera, of which 9 are peculiar. There are also very peculiar forms of a number of the genera of bats, some of which are exceedingly numerous, and mostly allied to South American genera; and the same remark applies to the fresh-water fishes. Insects are not very numerous, and butterflies especially so, but they seem to have a peculiar vegetation of most of the islands. In land-shells, however, the very reverse is the case, the Antilles being more productive than any other part of the world. The number of species of West Indian land-shells is equal to, or even greater than, that of the whole of Europe; while the number of genera is greater. No less than 11 of the genera are peculiar, a very unusual degree of peculiarity considering the extensive range of most of the genera of land-molluscs.

VI. The Nearctic Region.—This comprises all temperate North America; and its peculiar fauna is best represented in the United States, especially in that portion extending from the Mississippi valley to the Atlantic. It is allied both to the Neotropical and the Palaearctic regions, but it also possesses a considerable number of peculiar or characteristic forms. Among Mammalia it possesses 3 peculiar genera of moles, 2 of weasels, 2 of hollow-horned ruminants—Antilocapra (the prong-buck) and Apelocerus (the mountain goat or antelope)—and a number of Rodents, among which the most peculiar are the Saccamysida or pouched rats. Of those groups which are more peculiarly Neotropical it has skunks (Mephitis), raccoons (Procyon), and opossums (Didelphys). The number of Palaearctic genera is greater, the more important being lynxes, wolves, martens, bears, elks, racoons, etc. Some families, such as the thrushes, wrens, crows, hang-nests, woodpeckers, grouse, and some other families. Among the larger birds the ducks (Anas), the ruffed grouse (Cupidoana, &c.), and the created partridges (Oreorhyncus, &c.) are the most remarkable.

Reptiles seem to be more numerous than in the Palaearctic region. About a dozen genera of snakes are peculiar or characteristic, the most remarkable being the well-known rattlesnakes (Crotalus). Among lizards the so-called "glass-snake" (Ophisaurus) is a peculiar form analogous to our slow-worm; while the horned lizards (Phrynosoma) and many other genera of iguanidae are peculiar. Fresh-water fishes are extremely numerous and highly peculiar, there being no less than five (or, according to recent authors, eight) peculiar families, and a large number of peculiar genera. The perchs and their allies (Percida, Ichthyidae, Labracidae, and Benthoptermidae), the carp (Ciprinidae), the suckers (Catostomidae), and the catfish (Siluridae) are the most abundant groups.

In insects the Nearctic region is not remarkably rich or very peculiar. Its butterflies, though tolerably abundant, belong for the most part to well-known European groups with a small infusion of Neotropical forms in the Southern States. The same may be said of its Coleoptera. Land­shells are tolerably plentiful but not strikingly peculiar; the Alleghany district being the most productive, and possessing a large number of peculiar species. In fresh-water shells North America surpasses every other part of the globe, considering over a thousand species, most of them Unioidea or fresh-water mussels, having been described.

Subdivision of the Nearctic Region.—Owing to the researches of American zoologists these have been ascertained with tolerable accuracy, and may be termed respectively the California, the Rocky Mountain, the Alleghany, and the Canadian sub-regions. The western and California sub-region comprises the narrow tract between the Sierra Nevada and the Pacific, not including Lower California, but extending northward into British Columbia to about 54° N. lat. It is opaquely limited by a very few peculiar forms, and a greater infusion of South American types than are found in similar latitudes on the east coast. Among Mammalia it possesses a number of the genus Geo­cora, and 2 genera of humming-birds (Selachypoma and Athus); and among reptiles Leptosoma, a snake allied to the boa, and several forms of marsupial mammals, including the males, and Haplobunum, forming a distinct family of Rodents, being the most remarkable, while...
ANIMAL

Chamois, forming a distinct family allied to the swine, is the most interesting and peculiar bird of the Rocky Mountain sub-region extends eastward from the Sierra Nevada across the Rocky Mountains to a line a little eastward of the 106th meridian, where a marked change in the climate takes place, and animal life is found to occur. To the north it is bounded by the great Canadian forest-zone on the upper Saskatchewan, while southward it extends into Texas and Lower California along the line of hills indicates to the Ohio Valley; this sub-region is characterized by many peculiar animals, some of which are closely allied to Palearctic types—such as the so-called buffalo (Bison americanus), the big-horn sheep (Ovis montana), the glutton (Urocyon cinereoargenteus), while others are altogether distinct forms, as the prong-horn (Antilocapra americana) and the antelope or mountain goat (Oreamnus). Of Palearctic forms of birds it has two peculiar genera of grouse (Canodromus and Pseudocto), and the Arctic wood-pecker and partridge More especially Nearctic are a genus of wrens (Troglodytes) and some peculiar genera of finches and crows. The Nearctic pachyderms (Bos graminorum) are abundant.

The sub-Arctic or Canadian sub-region comprises the country to the east of the last, and as far north as Wisconsin and the southern parts of Canada. It contains examples of all that is most characteristic in Nearctic zoology, and has besides a few peculiar groups of these most noteworthy is the star-nosed mole (Condylura cristata), among birds the passenger pigeon (Ectopistes) and a few groups of wood-warblers and flycatchers. The reptiles are more peculiar, and there are several genera of snakes, including two of Heterodon and some of crotalines, which have extended beyond to Arctic lands, and there are the peculiar Amphibia for which North America is so remarkable, such as the two genera of the Sirenian (Siren and Psephenorhynchus), Menobranchus allied to the Proteus of Europe, Ambystoma, an eel-like creature with four rudimentary feet constituting a distinct family, and three peculiar genera of salamanders (Solinamorpha). Fishes, too, are very abundant, and several of the peculiar North American forms are confined to this sub-region, such as the perch-like (Pseudobranchus), the cave-fishes (Amblyopsis), the trout-perch (Perca morrioni), the great shad (Alosa rhomboides), and many more.

The sub-Arctic or Canadian sub-region has very few distinctive features, but it serves as a transition and separates the other two regions which almost meet into one. The musk-tailed (Ondatra) is almost the only form peculiar to it, though this is more properly Arctic. Many of the most characteristic Nearctic animals, such as Condylocer and Myolopits, only post enter its southern borders, while most of the Arctic forms are more abundant here than further south. Great numbers of birds migrate here in summer from the Southern States and Mexico, while a few especially Palaeartic groups (as Budorax, Phyllophryna, and Parvatina), which do not occur elsewhere in North America, have been found in Alaska. The scatony fauna of Greenland shows that it forms a part of this sub-region.

DISTRIBUTION OF THE HIGHER ANIMALS DURING THE TERTIARY PERIOD.

Before we proceed to other divisions of our subject, we shall find it useful to consider briefly the geographical relations of the Tertiary and post-Tertiary faunas to that which now exists, as we shall thereby arrive at a better comprehension of the true nature of zoological regions, and the meaning of the diverse and complex relations that exist between them.

Post-Tertiary Faunas.—Researches in alluvial clays and gravels, cave-earths, and other superficial deposits have made known to us very completely the character of the fauna which immediately preceded that now existing, and which lived at the close of the glacial period and in the era of post-glacial history. We find that a considerable number of the Mammalia were identical with living species, but along with these we almost always find a number of extinct forms, some closely related to living species in the same district, while others seem to indicate migration and a change of climate, by their resemblance to species which now only live further north or south. More extraordinary is the fact, that many of these recently extinct forms were of huge size as compared to any now living, often reminding us of the bulkiest inhabitants of the tropics or of those huge animals which we associate with an earlier condition of the earth's surface. Thus, in Europe during the post-Tertiary period, the reindeer, the glutton, and the Tartarian antelope inhabited France, along with powerful felines allied to the existing lion. At the same time elephants and rhinoceroses of several species roamed all over Europe, and at one period hippopotami ranged as far as the Thames, while the European beaver was replaced by a much larger species. In North America about the same time we find extinct lions, horses, tapirs, and camels, with bisons and musk-sheep, as well as elephants and mastodonts, and along with these, three genera of gigantic sloths as large as rhinoceroses and elephants, forming an assemblage of large Mammalia wonderfully different from that which now exists in the same country. In South America we find that there were larger monkeys than any now living, together with lions, bears, horses, tapirs, and anteaters, as well as mastodonts, and a tree-porcupine as large as a peccary. Here also were armadillos as large as a rhinoceros, and huge sloths as in North America but of more varied kinds. Even in Australia very similar phenomena occur. Extinct wombats were as large as tigers, kangaroos the size of elephants, and a phalanger nearly as large as a jow. They have been found in cave-deposits, along with a number of other forms more nearly like those now living. But in this case all are Mammals or Monotremes, and there is no sign of any migration from other lands, which indeed, owing to the insular nature of the country, we could hardly expect.

Again, in New Zealand and Madagascar we have a similar phenomenon presented to us by the great extinct terrestrial birds—the "moa," the "dodo," and the Eurygnath, which, from the conditions under which their remains are found, have evidently not long ceased to exist.

It appears then that in all parts of the world where we have been able to obtain the requisite information, the period which immediately preceded that in which we live was characterized by great movements or migrations of the higher animals where that was possible, and everywhere, by the extinction of a variety of huge animals belonging to almost every order of Mammalia and to several orders of birds, many of which are now totally unrepresented on the globe.

Tertiary Faunas, and their Geographical Relations with those of the Six Zoological Regions.—When we go back to the late and middle Tertiary deposits, we find a series of remains of the higher animals which exhibit yet more remarkable changes of distribution. Varieties of central and southern Europe, for example, were then inhabited by animals which now form the most characteristic features of Ethiopian and Oriental zoology—such as apes and monkeys, lions and hyenas, horses, tapirs, elephants, rhinoceroses, gruffes, and various antelopes, and along with these a number of extinct ancestral forms of many of the same groups. Among birds, too, we find the eastern jungle-fowl, the edible-nest swift, and the tropic, along with African parrots and plantain-eaters. In the Miocene beds of Northern India are found such typical African groups as the hippopotamus and gruff.

Now geology teaches us, that in the Eocene, or earliest period of the Tertiary epoch, a continuous arm of the sea extended from the Bay of Bengal to the Atlantic Ocean, cutting off the peninsula of India and Central Africa from the Palaeartic region, and it is therefore highly probable that, when this sea-bed became dry land, the various large Mammalia now so characteristic of Africa entered it from the

1 See Mr. Shears' V. Wool, jun., "On the Form and Distribution of the Land Tects during the Secondary and Tertiary Periods respectively, and on the effect upon Animal Life which past changes in Geographical Configuration have probably produced" (Philosophical Magazine, 1862).
first time from the north. This will explain many of the peculiarities of the Palaeartic, Oriental, and Ethiopian regions, and of their several sub-regions, and especially the persistence of low types in those districts which were wholly or partially protected from the competition of more highly organized animals.

The Tertiary faunas of North America compared with that of Europe exhibit proofs of a former communication between the two northern continents both in the North Atlantic and North Pacific, but always, probably, in rather high latitudes. This is indicated both by the groups which appear to have originated in one continent and then to have passed across to the other, and also by the entire absence from America of many important groups which abound in Europe (and vice versa), indicating that the communication between the two hemispheres was always imperfect and of limited duration.

The past zoological history of North and South America exhibits a somewhat analogous series of phenomena. Their productions were respectively isolated and the faunas of both these continents in closer connection with the great northern continent, made an almost equal advance in the development of the more highly-organized animals; while South America, for the most part isolated and thus prevented from receiving a constant supply of immigrants from the larger land-areas, developed a series of lowly-organized creatures, the smaller forms of which still constitute its chief zoological feature.

The knowledge we possess of Tertiary and post-Tertiary Productions were generally very limited, and seemed quite capable of maintaining itself in a wild state. Tapirs, though now more abundant in America than in Asia, are an Old World group, going back to the Lower Miocene in Europe, but only appearing in America in the post-Pliocene epoch. The peculiar armadillos (Dipropygus), now almost wholly Neotropical, are really a North American group, and probably only entered South America in later Pliocene times. Camels, though now confined to Asia and South America, are really a North American form, having been largely developed during the Miocene period, whence the true camels appear to have passed into Asia and the llamas into South America. True deer are European from Miocene times, but only appear in America in the later Pliocene and post-Pliocene epochs. Elephants are an Old World type, abounding from the Miocene period in Europe and Asia, but only appearing in America in the later Pliocene and post-Pliocene times. It is possible, however, that the Eocene Dinocerata of North America may be ancestral forms of Proboscidea, and that, as in the case of the horses, the development of elephants may have begun in America to be subsequently perfected in the larger area of the eastern hemisphere. As a last and curious example we may refer to the marsupial opossums, now exclusively American, but which are certainly recent immigrants from Europe or Asia. No trace of them occurs in American deposits before the post-Pliocene period, while they existed in Europe both in Eocene and Miocene times.

In the cases now adduced are sufficient to show how much interest attaches to the distribution of the ancestral forms of our existing animals; but we wait for fuller knowledge of the Tertiary deposits of Asia, Africa, and South America in order to complete the history of these migrations, and to gain some knowledge as to many other groups whose origin is now involved in obscurity (Geog. Dist. of Animals, vol. i. p. 153.)

Distribution of Marine Animals.

The zoological regions which serve to represent the main facts of the distribution of land animals are evidently inapplicable to those inhabiting the ocean, except in a few cases where the species is found to occupy only in shallow waters or to estuaries. It is true that, as the great continental areas are separated by the oceans, so the oceans are to some extent separated by the continents, but owing to the superior area of water the separation is far less complete and effective. In the southern hemisphere the Pacific, Atlantic, and Indian oceans freely communicate, and for truly oceanic animals there would seem to be no obstacle against universal distribution. Yet even in this case physical conditions, especially depth and temperature, are found to be effective barriers. The fact that the deep waters even of the tropical seas are cold, renders it indeed possible for some temperate or Arctic forms to cross the equator if they can travel at great depths; but for sur-
face-dwellers the broad expanse of warm water between the tropics, with its hosts of specially adapted organisms, forms an absolute barrier. In like manner the inhabitants of the tropical shallow waters are limited, and it is only by temporary subaerialities of land or elevations of the sea-bottom to near the surface, allowing of a passage east or west, that they can migrate into remote areas. We have good reason to believe, however, that subaerialities have often occurred between North and South America, allowing of a free interchange of aquatic animals between the Atlantic and Pacific oceans, while in Eocene times a strait is supposed to have connected the Atlantic and Indian oceans, and more recently the Red Sea and Mediterranean have almost certainly been united. We cannot, therefore, expect to find any such strongly-marked zoological regions among aquatic as among terrestrial animals, and the facts at our command entirely confirm this view. For many groups the warm and cold, or the northern, and the southern, seas, and the tropical, as among terrestrial animals, and the facts at our command entirely confirm this view. For many groups the warm and cold, or the northern, and the southern, seas, and the tropical, as among terrestrial animals, and the facts at our command entirely confirm this view.

DISTRIBUTION

**Actinianas.**—The coral-bearing groups of these animals are the more important, because of the abundance of fossil forms of every geological age. By far the greater number of these are found exclusively in tropical seas. Many of the Hydrocoralla are temperate and even Arctic, while among the Anthozoa the Caryophyllia alone are well represented beyond the tropics. The distribution of corals is in great part determined by the physical conditions of the sea-bottom. An influx of fresh water or of mud brought down by rivers is fatal to them, and volcanic deposits seem to be almost equally prejudicial. A high temperature is also necessary for most of the groups. Coral reefs are therefore restricted to certain seas and coasts within or near the tropics. They abound in and near the West Indies, on the east coast of Africa, in the Indian Ocean, in the Malay and Pacific archipelagoes, and on the coast of Australia, while they are absent from the whole of the west coasts of South America and of Africa, from the Indian peninsula, and from much of the east coast of South America. The coral reefs of the Boraus, in 33° N lat., are the farthest from the equator, while in the Red Sea they reach 30° N, in the Pacific 27° N, while they nowhere extend to more than 39° S of the equator. Besides the corals actually forming the reefs, the same localities abound in what are termed deep-sea corals, and thus the general distribution of the group is determined by similar conditions. The coral regions are therefore somewhat peculiar, and differ considerably from those which best exhibit the distribution of other marine animals. The regions adopted by Mr Dana are three,—the first comprising the Red Sea and Indian Ocean, the second, the whole of the Pacific islands and the adjacent coasts of Australia, and the third the West Indies. This last region is the most isolated in position, and it is not surprising that it should contain the largest proportion of peculiar forms. The corals of the Central Pacific are also very peculiar, as are those of the Red and Indian seas. Considering the great similarity of the molluscan fauna of the Pacific and Indian oceans, it is remarkable that the corals should be so different as Mr Dana’s tables show them to be. Although some corals exist at great depths in the ocean, they diminish rapidly when we pass the moderate depth of 200 fathoms. The “Challenger” expedition obtained 27 genera at a greater depth than 250 fathoms, but only 3 of these extended below 1500 fathoms. Count Pourtales on the American coast found them at 400 fathoms, the “Porcupine” expedition first found them at a greater depth than 1000 fathoms in the North Atlantic, while in the Pacific a single species has been found at the enormous depth of 2900 fathoms. The following genera were obtained by the “Challenger” dredgings at a greater depth than 1000 fathoms,—*CARYOPHYLLA, DETERGENTHUS, CERATOSTREHAS, FLATELLUM, AMPHITHELA, CYTROHELA, AND FUMUS.* Some of these were of brilliant colours—puck, madder-red, white, and emerald green. A large proportion of fossil genera of corals survive in the deep seas, no less than seven genera, before only known in the fossil state, having been added by the explorations of the “Challenger.” seven of these are found at or below 1000 fathoms. It is curious, however, that the deepest by far of all corals, *Fungia,* is not known to be fossil, nor is any member of the family Stylasteridae, six genera of which are deep-sea corals; so that too much importance must not be attached to the fact that genera hitherto only known as fossils having been found living at great depths in the ocean. (Dana’s “Zoophytes” in U.S. Exploring Expedition, vol viii., “Report on Corals Dredged by the ‘Challenger,’” by H. N. Moseley, Proc. Roy. Soc., vol xxxiv. p 544.)

**Polyzoa.**—The coral-like Molluscs forming the extensive group of marine polyzoa, have been carefully studied,
but they are so widely distributed as to offer few special features of distribution. One or two families—as the Celleporidae—are almost exclusively tropical; others—as the Catostomidae and Vinculariidae—are confined to the southern hemisphere. The Diasteroidea are mostly northern, while the Celleporidae are found in both the north and south temperate seas. But the great mass of the families are either commonly distributed or widely scattered over the globe. They range to high northern latitudes, having been found abundantly by the Swedish expedition on the shores of Nova Zembla in 76° N. lat. They inhabit the profound depths of the ocean, having been dredged from near 2000 fathoms in the North Atlantic, 2500 fathoms in the Pacific, and 2850 fathoms in the Southern Ocean during the voyage of the “Challenger” (Baas’s Brit. Mus. Catalogue of Marine Polyzoa; ‘Challenger’ Reports, Proc. Roy. Society, vol. xxiv. pp. 466, 468, 572, 635.)

Echinoidea.—The best-known groups—the starfishes and sea-urchins—occur abundantly as fossils, but their existing distribution does not offer many features of special interest. The Asteroidae, or star-fishes, are most abundant in the Indian and Pacific oceans, while the Ophiuroidea (brittle stars) are better represented in the European and African seas. A few genera are exclusively American, but on the whole the star-fishes are far less abundant in the western than in the eastern hemisphere. Although most abundant in shallow seas, they also inhabit the floors of the deepest oceans, some having been obtained by the “Challenger” expedition from a depth of 2700 fathoms in the Pacific. They abound even in the Arctic seas, hundreds of sea-stars having been obtained by a single haul of the swab at 76° N. lat. in Novaya Zembla by the Swedish exploring ship “Proven” in 1876. The Echinoidea (sea-urchins) are also very abundant in Eastern seas, while they are comparatively scarce in America. Almost much larger and more varied in the tropics, they are tolerably abundant in temperate and cold seas; and they probably reach the greatest depths in the ocean, since some have been obtained by the “Challenger” from a depth of nearly 3000 fathoms in the North Pacific. (Nature, vol. xii. p. 558; Van der Hoeven, Handbook of Zoology.)

Crustacea.—The distribution of the higher Crustacea has been discussed in detail by Mr James Dana in his “Zoology of the United States Exploring Expedition” and, considering that most of the species are shore-dwellers, the facts are very interesting and often quite unexpected. We will, therefore, give an abstract of the conclusions of this writer.

The marine regions which best represent the distribution of these animals are three in number, termed by Mr Dana the Occidental, the Afro-European, and the Oriental. The first comprises both coasts of the American continent; the second, the eastern shores of the Atlantic both African and European; and the third comprehends the vast area from the east coast of Africa to the Central Pacific. Each of these is of course subdivided into climatological and local provinces, but the primary divisions alone are those which we have now to consider. The facts adduced in support of this scheme of distribution are very interesting. No less than 47 genera are exclusively American, and 15 are common to both the east and west coasts; but as 20 genera are said to be confined to the west coast, and 6 to the east, it will be seen that these two provinces are really very distinct, even if they do not form primary regions. The Afro-European region has 19 peculiar genera, and only 8 in common with the American region; so that the eastern and western shores of the Atlantic are decidedly more distinct than the eastern and western coasts of America. The extensive Oriental region is by far the richest, containing no less than 115 peculiar genera, and only 19 in common with the Afro-European region. About 40 genera are said to be found in all three regions.

The distribution of Crustacea in relation to temperature also presents some peculiar features. The species are almost equally divided between the tropical and the extra-tropical regions. The highest form of Crustacea—the Brachyura—are most abundant in the tropics, while the less developed Amphipoda and Isopoda are more numerous in temperate and frigid zones. This may, however, in part depend on these groups having been less assiduously collected in the tropics. More interesting, and less open to doubt, is the fact that among the four chief types of Crustacea—Brachyura, Macroura, Isopoda, and Amphipoda—the most highly developed species are extra-tropical. The largest species of the Macroura are found in temperate seas, and though the largest Brachyura are tropical, yet the Macroura—the highest group of Brachyura and of all Crustacea—reach their largest dimension in the temperate zone. Mr Spencer Bate adduces the curious fact that in the cosmopolite sub-family Lysianassina, the largest species are found in Arctic and Antarctic latitudes, while a species from the Straits of Magellan so closely resembles one from Spitzbergen that they may even be identical; and in the family Caprellida the same species often occurs in both the northern and southern hemispheres. Mr Dana lays great stress on similar cases of wide and discontinuous distribution, which (he considers) necessitate the adoption of the theory of special creations. Thus, two species (Kraussa rugosolea and Galnea natalensis) are found at the Hawaiian islands and Natal, but in no intermediate localities. Other identical species occur in the Japan seas and Natal. The same species (Platuna tomentosa) occurs in South Africa, New Zealand, and Valparaiso; and another (Cancer Edwardian) at New Zealand and Valparaiso. The same species and several identical genera (Latreilieu, Ephyra, Seygosa) are found in the Mediterranean Sea and Japan, but in no intermediate districts. Closely allied species (of the genera Amphiproduces and Octis) are found in Australia and Chili, but perhaps the most singular fact is the occurrence of closely allied or perhaps identical species of Palamos in New Zealand and the British Seas, and also of certain British or American genera (as Portunus and Pinnixa) in New Zealand. Many of these cases are, especially the last, undoubtedly offer great difficulties on the theory of transmission and specific modification. There are, however, some considerations which afford hints for a possible solution of the difficulty. We now know many cases in which the distribution of an animal or a group of animals has been rendered discontinuous by its recent extinction in intermediate localities. The tapirs, for example, exist only in tropical America and the Malay islands, and it might well be argued that no passage from one of these localities to the other is conceivable for such an animal. But we now know that the South American tapir lived in North America down to post-Pliocene times, that in Europe there were tapirs in the later Pliocene period, while in the Pliocene or Miocene periods allied species inhabited North India and some parts of China. The present remotely isolated forms are therefore seen to be the remnants of a genus which once ranged over almost the whole northern hemisphere. Perhaps more to the point is the case of the genus Panopeus, adduced by Mr Woodward in his Journal of the Mollusca. There are only 11 living species, which occur widely scattered in the northern seas, the Cape of Good Hope, Australis, New Zealand, and Patagonia. But of this same genus nearly 150 fossil species are known, distributed over many intermediate localities, so that the existing species are seen to be but relics of an ancient form of life lingering at various points on the outskirts of the

Cirripedia.—The barnacles are a tolerably extensive group of anomalous Crustacea, whose distribution differs somewhat from that of the more typical portion of the class. The genera are almost all widely or at least distributed, from 74° 18' N. lat. to Cape Horn, and some of the species have an equally wide range. No genus having more than a single species is confined to the torrid zones, and only two genera are limited to the southern hemisphere. Although the temperate zones have a smaller area than the torrid, they possess rather more species of Cirripedia, which Mr. Darwin imputes to the fact of these zones being two, while the torrid is but one. As in some groups of the higher Crustacea, large species are most abundant in the temperate zones. Owing to the wide range of the genera the Circumpolar regions can only be determined by the distribution of species. These, according to Mr. Darwin, are as follows—1. The North Atlantic, comprizing North America and Europe down to N. lat 30°, 2. The West American, from Behring Straits to the Strait of Magellan, 3. The Malay, from India to New Guinea. The Australian, comprizing Australia and New Zealand, The Malayan and Australian regions are the richest in Cirripedia. During the voyage of the "Challenger" these animals were found to inhabit the deep seas, the most remarkable being a gigantic Scutella genus from a depth of 2850 fathoms in the North Atlantic, while other forms occurred at almost the same depth in the Pacific (Darwin's "Monograph of Cirripedia," Ray Society, 1854).

Mollusca.—The marine Mollusca, from their great abundance in all seas, the ardour with which they have been collected and studied, and the frequency of their occurrence as fossils, offer an extensive field for the study of distribution. But many causes have combined to render the results yet arrived at unsatisfactory. Their classification has been for some time undergoing a progressive change, owing to the greater attention paid to the organization and development of the animals, but there is still much uncertainty as to the limits of genera and sub genera. Owing to their being in many cases articles of commerce, either on account of their uses or their beauty, the place where they were originally obtained has often been confused with the place from which they were exported. Their numbers, too, have so rapidly increased that few persons have been found to devote themselves to the great labour of geographical tabulation. And, lastly, the genera are so often of great extent and world-wide distribution that the range of species alone has generally been attended to.

The late Dr. Woodward established a series of eighteen marine provinces, founded professedly on the fact of one-half of the species being peculiar. The distribution of the genera is only casually mentioned, and it is almost certain that a large number of these provinces have no claim to rank as primary regions as regards the distribution of the Molluscan fauna. Dr. Woodward himself states that his Arctic province is comparatively small and exceptional, while the three southern faunas of America, Africa, and Australia differ extremely. All the warmer provinces may, he says, be naturally grouped into three great divisions—the Atlantic, the Indo-Pacific, and the West American; and these are perhaps the only true Molluscan regions. The Indo-Pacific extends from the Red Sea and east coast of Africa to the easternmost Pacific islands, and exactly corresponds to Mr. Dana's Oriental region for Crustacea. About 100 species are said to range over nearly the whole of this vast area. The Atlantic region unites the faunas of the east coast of America with that of West Africa and South Europe, but it also has considerable affinity for that
of West America, since about 60 genera are common to both. Several important genera appear to be restricted to the temperate zone, which should perhaps form a distinct region. About 30 important genera are confined to the Indo-Pacific region; and nearly 20 are peculiarly tropical. The Atlantic coasts have few peculiar genera of importance, and the west coast of America hardly any remarkable difference from the Atlantic fauna on the one side and the Pacific on the other being chiefly specific. There is said to be not a single species common to the east and west coasts of tropical South America; while the corresponding coasts of North America have more than 50 species in common, and many others so closely representative as to be almost identical to equivalent species.

The shells of the Mediterranean were once supposed to be very peculiar, but recent dredgings have proved that most of them exist also in the Atlantic, and it is now doubted if any are really confined to that sea. A small number (about 70 or 80 species) are identical with Red Sea shells. The marine-shells of New Zealand are exceedingly unlike those of Britain,—exactly the reverse of the common and many others so closely representative as to be almost identical to equivalent species.

The influence of temperature on the distribution of Mollusca is very marked, the warmer regions presenting a greater variety of forms, with a greater proportion of large and finely-coloured species. Yet in some cases the largest species are extra-tropical, a striking example being found among the volutes, which abound in tropical seas, yet attain their largest size in New Zealand. In temperate and even in Arctic seas Mollusca are perhaps as abundant individually as in the tropics, but the number of species and genera is far less, and they are generally dwarfed in size, and of obscure colours.

Till a comparatively recent period very few shells had been obtained at a greater depth than 200 fathoms. These were mostly of small size and obscure colours, belonging to groups of wide range and great geological antiquity. *Dentalium, Cryptodona, Leda, and Areca* were the most important, and it was generally believed that the zero of Molluscan, if not of all but the very lowest forms of life, would be found at a depth of 300 or 400 fathoms. The recent development of deep-sea dredging has, however, completely changed our ideas on this subject, and the Mollusca as well as most other groups of Invertebrata are found to be capable of existing in the profoundest depths of the ocean. Off the coast of Norway Professor Sars has obtained Mollusca from a depth of 450 fathoms; and near Florida, Agassiz found them at 500 fathoms. During the cruise of the "Porcupine" Professor Wyville Thomson obtained species of *Pleuronectes and Dentalium* from the enormous depth of 2500 fathoms in the Bay of Biscay. During the recent voyage of the "Challenger" many other groups have been discovered in the deepest seas. In the North Atlantic, 500 miles west of Teneriffe, three small living Mollusca belonging to the genera *Arca, Limopsis*, and *Leida* were dredged from a depth of 2740 fathoms; while in the Central Pacific, from depths of 2800 and 2900 fathoms, species of *Arca, Neora, Pleuropectes, Trochus, Fusus, Dentalium*, and some others have been obtained. All are small obscurely-coloured forms, resembling Arctic rather than tropical shells, due no doubt to the fact that in these profound depths the water is permanently at a temperature very little differing from that of melting ice. Equally interesting is the fact ascertained by the naturalists of the "Challenger," that the waters of the ocean down to the enormous depth of 1500 fathoms abound with true pelagic Mollusca belonging to the orders Pteropoda, Heteropoda, and Gasteropoda, while below this limit they appear to be absent. (Woodward's *Manual of the Mollusca*; "Challenger" Reports, "Proc. Royal Society,* vol. xxiv., pp. 535, 578; Letters of Sir Wyville Thomson, in *Nature*, vol. 7–10.)

**Fishes.**—The distribution of marine fishes appears to agree generally with that of the Mollusca and Crustacea, their greater powers of locomotion, leading to a wider dispersal, being to some extent compensated by the more marked origin of most of the species, genera, and families. There are about 80 families of marine fishes, and no less than 50 of these are almost universally distributed. Several other families range over all tropical seas. About 5 families are found only in the Arctic and temperate seas of both hemispheres, while two (*Discodus* and *Acipenseridae*) are found in the north temperate sea only. The least marked region is undoubtedly (as in the Mollusca and Crustacea) that which extends from the Red Sea and east coast of Africa to the Sandwich Islands and Australia. About ten families are confined to this region (which may be termed the Oriental or Indo-Pacific marine region); many genera of other families equally characterize it, while there are even a number of species which range over the greater part of its vast area. On the other hand, no family of importance seems to be confined to the Atlantic, or to the coasts of Eastern or Western America, the differences of these provinces, as of the European and American shores of the Atlantic, being confined to genera and not more largely to specific forms. Many species of fish have enormous ranges, extending from the North Atlantic to Australia, from the Red Sea to the Sandwich Islands, and from New Zealand to South America. Some species range over almost the whole Atlantic Ocean, and a considerable proportion of these inhabiting the Atlantic and Pacific coasts of Central America have been found by Dr Gunther to be identical.

It has long been known that a considerable number of fishes inhabit very deep water, never coming to the surface when alive; but the researches of the "Challenger" expedition have added greatly to our knowledge of these curious forms. A large number of genera and species, many of them new, and belonging to ten distinct families, have been obtained in the nets and trawls from a depth of 200 to 2400 fathoms in all the great oceans. These often come up greatly inflated by the expansion of the internal gases; some were transparent, several were blind, and some had transparent phosphorescent organs on the head. The marine sea forms generally have a wide range. The greater number of the new and remarkable forms obtained during the voyage of the "Challenger" belong to the *Scoleides*, a family known to inhabit the deep waters of all the warmer seas. The size attained by marine fishes appears to have no relation to latitude or temperature. (Gunther's *British Museum Catalogue of Fishes*; Mr J. Murray's "Preliminary Report on Vertebrates collected by the "Challenger," " *Proc. Roy. Soc.* vol. xxiv. p. 537.)

**Marine Turtles.**—These reptiles, forming the family *Chelonidae*, are too few in number and too widely distributed to afford any indications as to oceanic regions.

**Cetaceans.**—The whales and dolphins form the group of truly oceanic Mammalia. They are very widely distributed, but their classification is too unsettled, and their history too imperfectly known, to throw much light on the general question of oceanic distribution. Two of the families—*Balaenidae* and *Balaenopteridae*—seem to be confined to the cold and temperate seas of both hemispheres. The *Cetacea* (comprising the sperm whales), on the other hand, are more especially tropical and sub-tropical. The *Hyperoodontidae*, or beaked-whales, are widely distributed in northern, southern, and tropical seas; while the largest family—the *Delphinidae—are universally distributed. The largest whales inhabit the cold northern and southern seas. (Dr J. E. Gray's *British Museum Catalogue of
The general facts of distribution of marine animals now adduced accord very well with what we know of those terrestrial changes which have led to the actual distribution of land animals. The great Indo-Pacific region—so well marked in every important group of marine animals, as we infer from the fact that Australia has been isolated during the whole of the Tertiary, and probably during much of the Mesozoic epoch, while numerous islands in the Indian and Pacific oceans have always afforded an extensive shore-line favourable to the development of aquatic forms of life. The Atlantic has probably been for long periods even more included than it is now, owing to the greater southern extension of South Africa and South America, while the profound depths of its central channel have served as a barrier between the inhabitants of the shallow waters of its eastern and western shores. In like manner the great troughs of deep water which separates the most eastern groups of the Pacific islands from the west coast of America has necessarily led to the establishment of distinct oceanic faunas in those regions; while this very fact—the remarkable distinctness of the Pacific and West American faunas—tells us plainly that this barrier of deep ocean is one of the ancient features of the earth's surface.

We shall find, too, that many of the details, and not a few of the anomalies, of the distribution of marine animals become intelligible from our knowledge of past geographical changes. The considerable affinity between the Crustacea, Mollusca, and fishes of the eastern and western coasts of America exactly corresponds to the fact, clearly established by a consideration of the distribution of living and extinct land animals, that these oceans have been united, at various times, by a land-bridge connecting them. Such land-bridges are always very poor in animal life; and it is therefore not surprising that the Mediterranean should now contain hardly any forms but such as it has received from the Atlantic, or from the Red Sea during a submergence of the Isthmus of Suez. The numerous allied or even identical forms in the northern and southern oceans, which are not found in the intervening warm regions, are more difficult to explain. Mr. Darwin believes that such facts are due to the action of the glacial period, which at its height may have cooled certain tracts of the tropical ocean sufficiently to allow temperate forms to cross from the northern to the southern hemisphere or the reverse. Perhaps, however, the agency of icebergs may have been sufficient without any permanent cooling of the equatorial ocean; for even now these huge floating glaciers often reach to 40° N lat., and 32° S.

The great importance of the Panama Canal, says Captain Mawson, is, sometimes even reach the tropics. We may therefore well suppose that during the height of the glacial period icebergs would not only regularly reach the tropics, but, carried on by currents in definite lanes, might often pass across the equatorial zone, carrying with them a girdle of cold water in which many of the cold-water forms of the Arctic or Antarctic seas might safely make the passage to another hemisphere. The fact that many forms of plants peculiar to cold or temperate regions are found scattered on isolated mountain summits in the tropics is, as Mr. Darwin has shown, to be explained only by the influence of an extreme glacial period, and thus must have produced analogous effects on the inhabitants of the ocean. (Origin of Species, 6th ed. p. 330.)

Distribution of Animals in Time.

This subject will necessarily be treated in some detail under the articles Geology and Palaeontology. Here we shall only sketch its outlines and general principles.

The past history of living things as revealed by geology is an ever-changing panorama. At each successive stage some forms disappear, while new ones take their place. The farther we go back the more unlike is the general assemblage of animals and plants to that which now exists. If we confine our attention to any one class or order of animals, we find that it makes its first appearance at some definite epoch, and, under species changing forms, either continues till the present time, or reaches a maximum, diminishes, and finally disappears. Thus some groups are altogether modern, others extremely ancient, some have run through all their phases in a comparatively short period, others have lived from the earliest epochs of the earth's history of which we have any record and still survive. If we could be sure that the numerous fossils yet discovered gave us anything like an adequate idea of all the varied forms of life that had ever lived upon the globe, and the order in which they had appeared, we should be in a position to decide as to the truth and value of the development hypothesis. But the more we examine the question, the more certain it becomes that the "geological record," as it is termed, is extremely imperfect, and that the whole of the extinct animals which we have discovered do not form any fair representation of the entire series that have lived upon the earth. This is the case even with the more recent deposits and those which are richest in animal remains, but as we go back into the past the record becomes more and more imperfect, till in the Secondary, and still more in the Palaeozoic formations, we only have preserved to us a few scattered fragments, equivalent perhaps to a few pages with here and there a short chapter taken at random out of a voluminous history. The causes of this necessarily imperfect record of the past have been fully discussed by Sir Charles Lyell and Mr. Darwin; we need only refer here to two general causes of such imperfection. The first is, that every aqueous deposit is formed by the wearing down of previous deposits, so that the records of one age are, to a large extent, necessarily destroyed to provide the records of the next, which in its turn is destroyed in a succeeding age. The other cause of imperfection is, that extensive areas are always sinking (to allow new deposits to be formed over them), and are being subjected to subterranean heat to such an extent as to change their texture and obliterate their fossils, when they become crystalline or metamorphic rocks. The more recent deposits so acted on will rarely have had time to have become raised above the sea-level, and subsequently exposed by denudation, yet certain Eocene strata in the Alps are stated by Sir C. Lyell to be truly metamorphic (Student's Elements of Geology, p. 600). The older the formation is, the more frequently will it have been exposed in one area or another to this metamorphic action, and it follows that, going backward in time, we shall at last come to a period, all the formations antecedent to which will have become metamorphic, and their fossils, if any, obliterated. We are thus led to have almost reached such a state of things at the base of the Palaeozoic rocks; and there is good reason to believe
that an extensive series of fossiliferous deposits may have once existed, whose record of the earlier stages of the history of life upon the earth has been either destroyed by denudation or obliterated by internal heat. This being the case, we must carefully distinguish between positive and negative evidence; and we may also with propriety apply such principles as can be established by means of the fuller record afforded by the Tertiary deposits, to interpret the more scanty and fragmentary record with which we have to deal in the older rocks. We will now proceed to sketch very briefly the successive stages of the development of animal life as indicated by the materials at our command.

The lowest and most ancient of all the stratified rocks is the Laurentian, consisting of crystalline beds of gneiss, mica-schist, quartzite, and limestone, reaching in Canada the aggregate thickness of 30,000 feet. The whole mass was long thought to be destitute of organic remains, till in one of the beds of limestone in the lower part of the series a curious structure was discovered, which is held by Dr. Carpenter and Professor Rupert Jones, who have made a special study of the Foraminifera, to be the fossilized remains of one of that group of the Protozoa. It has been named *Evanus caudatus*, and if really organic (which is denied by some naturalists of eminence) it is by far the oldest trace of animal life. The Upper Laurentian deposits, 10,000 feet thick, lie unconformably on the lower, and seem to be entirely destitute of fossils.

The next formation is the Cambrian, largely developed in Wales, Scandinavia, Bohemia, and North America, and consisting of a variety of distinct deposits. But in the very lowest of these (the Longmynd group) abundant organic remains have recently been found, comprising perfectly developed brachiopodous and pteropodous Mollusca, entomotheric Crustacea, and Trilobites. In the overlying beds of the same formation similar forms abound, and are accompanied by sponges, annelids, graptolites (which are supposed to be peculiar extinct Hydrozoa), starfishes, and encrinutes. Here also first appear lamellobranchiate Mollusces, belonging to the families Arcidae, *Nuculidae*, and *Atlantidae*, and there are even some *Orthoceratidae*, belonging to the highest order of mollusces—Cephalopoda. The Trilobites are already wonderfully varied, the smallest and largest kinds being found here (one 2 feet long), species with the least and with the greatest number of rings, blind Trilobites, and others with the most largely developed eyes. (Lyell's *Students' Elements of Geology*, pp. 453, 485, 634)

We next come to the Silurian formation, in which we first meet with corals, and three great divisions Ruggosa, Tabulata, and Perforata,—ostroacide Crustacea, Trilobites in enormous variety, Merostomata—extinct Crustacea of gigantic size, Echinoida (*Palaeogehia*), and true gastropodous Mollusces. And lastly, in the Upper Silurian deposits, we find vertebrates, whose first representatives are several genera of fishes belonging to the Ganoid and Plagiostomous groups.

In the succeeding Devonian formation we find an abundance of new families of fishes, a fresh-water mussel of the living genus *Anodons*, and no less than six forms of winged insects. These have been found in the Devonian rocks of New Brunswick, and are considered by Mr. Scudder to be ancient forms of Neoptera.

The Carboniferous formation is very rich in animal as well as vegetable remains; and, along with most of the animals already met with, we find several higher types of great interest. The higher magnesian Crustacea (*Arthropodous*) are represented by a number of living genera. Mollusces and Crustacea of the higher classes are now appear. Reptiles are still mostly of extinct types—Pterosaurus, Ichthyosaurus, Dinosaurs, &c.; but among birds we find some allied to existing waders, as well as the curious extinct group of Odon-ternithes, or toothed birds. (Marsh, in *American Jour. of Science and Arts*, vol. x. 1873.)

When we pass over the great eon of time which separates the Mesozoic from the Cenozoic or Tertiary period, we at once come upon a host of new forms closely resembling those which now live upon the earth. The majority of living genera of Mollusces now appear, with a gradually increasing proportion of living species, as we pass from the Eocene to Miocene and Pliocene times; the highest forms of Crustacea are plentiful; Insects of all orders, and almost all of living genera, abound; fishes of...
living genera gradually appear, and true snakes (*Ophidius*) are first met with. Among birds, all the existing orders, many families, and some living genera appear in the Miocene period. Mammals, however, exhibit the most surprising advance. Ancestral forms of all the existing orders are found in the Eocene formation; in the Miocene, most living families are well developed, while in the Pliocene and post-Pliocene deposits we find the genera and species for the most part closely resembling those that still inhabit the earth. The following diagrammatic table will enable the reader better to comprehend the main facts which we have endeavored to set forth. It comprises only the larger and more important groups of animals, and of each of these the known range in time is indicated by a thick line. It has not been attempted to show the breaks which occur in our knowledge of the range of a group, since no one now doubts that where any type appears in two remote periods it must have been in existence during the whole intervening period, although we may have no record of it. Neither has it been attempted to indicate the abundance or scarcity of the group in each period, this being a detail suited only to a special treatment of science of paleontology. It must also be remembered that it is often impossible for us to determine whether the increased prevalence of fossil remains of a particular group is due to a really greater development of the animals, or only to more favourable conditions for their preservation and discovery.

On considering the successive phases of animal life presented to us by the fossil remains preserved in the rocks we cannot help perceiving that there has been on the whole a steady advance in organization and an increase in variety and complexity, from the earliest geological period to the present day. Thus the oldest known fossil belongs to the lowest type of animal life—the Protozoa. Then we have the lower forms of Mollusca—Bivalvia and Pteropoda—followed by the Cephalopoda and Gasteropoda.

### Table Showing the Range in Time of the More Important Groups of Animals

<table>
<thead>
<tr>
<th>Animal Groups</th>
<th>Paleozoic</th>
<th>Mesozoic</th>
<th>Cenozoic</th>
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<tbody>
<tr>
<td><strong>Protozoa</strong></td>
<td>Ciliata</td>
<td>Ciliata</td>
<td>Ciliata</td>
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<td>Foraminifera</td>
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<td>Spongia</td>
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<td><strong>Cnidaria</strong></td>
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<td></td>
<td>Anthozoa</td>
<td>Anthozoa</td>
<td>Anthozoa</td>
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<td><strong>Echinodermata</strong></td>
<td>Echinodermata</td>
<td>Echinodermata</td>
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<td></td>
<td>Asteroidea</td>
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<td></td>
<td>Echinidea</td>
<td>Echinidea</td>
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<td><strong>Crustacea</strong></td>
<td>Crustacea</td>
<td>Crustacea</td>
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<td></td>
<td>Ostracoda</td>
<td>Ostracoda</td>
<td>Ostracoda</td>
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<tr>
<td><strong>Mollusca</strong></td>
<td>Mollusca</td>
<td>Mollusca</td>
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<td>Gasteropoda</td>
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<td>Cephalopoda</td>
<td>Cephalopoda</td>
<td>Cephalopoda</td>
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<td><strong>Vertebrata</strong></td>
<td>Vertebrata</td>
<td>Vertebrata</td>
<td>Vertebrata</td>
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<td></td>
<td>Actinopterygii</td>
<td>Actinopterygii</td>
<td>Actinopterygii</td>
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<td></td>
<td>Reptilia</td>
<td>Reptilia</td>
<td>Reptilia</td>
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<td></td>
<td>Aves</td>
<td>Aves</td>
<td>Aves</td>
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<tr>
<td></td>
<td>Mammalia</td>
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The Entomostraca, Trilobites, and Phyllopods, come before the higher Decapod Crustacea, and of these the highest form—the Brachiura—appears much the latest. Again, all the aquatic classes of invertebrates appear in abundance before the earliest of the aquatic vertebrates—fishes—make their appearance. These are followed by Amphibia, and later still by true reptiles. The most highly organized birds and mammals appear later, and almost simultaneously.

There are, it is true, many anomalies, the higher and more complex organisms in some of the minor groups appearing before the lower, but these cases generally occur in the oldest (Paleozoic) formations, where, on the principles already laid down, the record must be necessarily more imperfect. In the Mesozoic and Tertiary formations the succession is more regular, and accords better with the grade of organization of the several groups, and the best examples of this are to be found among the Mammalia of the Tertiary period, the series of which is, in some groups, tolerably complete. Thus, among the Ungulata we find in the Eocene deposits the remains of a number of generalized types, such as the Paleotherium, allied to the horse, tapir, and rhinoceros; Lophodon, an ancestral form of tapir; Anoploterium, intermediate between pugs and ruminants; Palaeotherium, allied to the tapir and horse; and the North American Orkypus, a remote ancestor of the horse. This last-named animal, Professor Marsh tells us, had four toes in front and three behind, and was no larger than a fox; yet an almost perfect series can be traced, in succeeding deposits, of animals with smaller and smaller lateral toes, the size and speed increasing, the head and neck becoming longer, the canine teeth decreasing in size, the bones of the fore-arm consolidating, and other modifications successively taking place till we come, by almost imperceptible gradation, to an animal so completely unlike the one we started from as our existing horse. In like manner we have the extinct families of the Anoplotheridae, Anthrotheridae, Protheridae, and many groups of doubtful affinities, which seem to be ancestral forms from which sprung the swine, hippopotami, and all our ruminants. These become more specialized in the Miocene, but it is only in the later Miocene and Pliocene that we find true deer, camels, oxen, and antelopes. So, the oldest form of the Carnivora, found in the very lowest bed of the Eocene formation, is the Aroctopus, one of the generalized types which cannot be referred to any existing family. A little later the Canidae and Viverridae appear, while the more specialized and highly organized Felidae are not found till the Miocene period. To exhibit in detail the succession and affinities of extinct forms is the province of palaeontology; we can here only give the chief facts in outline, which however are sufficient to render intelligible the great principle which almost all palaeontologists have arrived at, viz.—that extinct animals exhibit more generalized structures, as compared with the more specialized structures of recent animals (Owen's Palæontology, p. 406).

Having now laid before our readers a sketch of the more important facts of the distribution of animals in time, we will conclude this branch of our subject with a brief discussion of its bearing on the theory of evolution, and on the perfection of the geological record. The abruptness with which animal remains in considerable variety first appear in very ancient deposits is undoubtedly a most remarkable phenomenon. With the exception of the still somewhat doubtful Eocoon, the vast series of Laurentian rocks have produced no fossils. But the moment we enter the Cambrian formation we at once meet with a somewhat extensive series of complex and varied organisms. Besides the Brachiopods we have Pteropods, a by no means low form of Mollusca; while the Trilobites and Phyllopods exhibit a considerable amount of specialization. Almost as early, we have sponges, annelids, star-fishes, cucumites, lamellibranchiats, and Orthoceratae—a variety of divergent and complex types, which, on any theory of development, indicates a very long succession of ancestral forms. But we must also bear in mind that the few fossiliferous deposits of this early age cannot possibly have made us acquainted with more than a minute fraction of the organisms which then existed on the whole earth. We are therefore compelled to believe that the absence of all remains of more ancient forms of life in the pre-Cambrian rocks is fallacious, and due solely to no record of them having been preserved, or, if preserved, to their not having been discovered by us. This conclusion is supported by analogies which connect our early records of fossil life with later and more highly specialized formations. Accordingly, the highly specialized corals and fishes of the Silurian rocks must have had ancestors in Cambrian times of which we know nothing, and the sudden appearance of perfectly developed winged insects in the Devonian formation, plainly tells us that during countless unrecorded ages various lower forms of the present terrestrial Annulosa must have been gradually developing into these marvellously specialized types,—yet these lower forms (Myriapods, &c.) only appear as fossils in the succeeding Carboniferous formation. Such highly organized insects also imply the existence of vegetation, and, by analogy, of other terrestrial animals of an equally high grade of development. Hence the discovery of these winged insects (which can, with great probability, be classed in one of our existing orders—the Neuroptera) opens up to the imagination of the evolutionist a wonderful picture, far removed from the dreary waste of waters which was once thought to characterize the epoch of the early Palaeozoic formations. Geologists, indeed, have long taught us that the vast piles of sedimentary rocks of the Silurian, Cambrian, and even the Laurentian period necessarily implied the co-existence of extensive continents or islands whose denudation could alone produce them; and now the theory of evolution enables us to clothe these ancient lands with vegetation and people them with animal life, since it is only thus that we can account for the amount of space and time sufficient for the development of the wonderful insects, the land shells, the Amphibia, and the reptiles,—all of which appear suddenly, in perfect and completely organized forms, in some parts of the Palaeozoic series. When we consider that we have indications of the existence during the Carboniferous age of such diversified and highly specialized types of Annulosa as myriapods, spiders, cockroaches, locusts, dragon-flies, ephemerides, lamellicorn-beetles, and bombyciform moths,—so that it is highly probable that no fresh ordinal type of insects has originated during all succeeding ages, and when we further consider that all these are specialized modifications of simpler ancient forms, we shall be forced to conclude that, whatever time may have elapsed from that epoch to the present day, a far longer time is required, antecedent to the Carboniferous period, to allow of the development of such varied terrestrial forms of life.

An bearing upon this question is important to consider how scattered and fragmentary are the few indications of mammalian life older than those of the Tertiary period. Sir Charles Lyell tells us, that, up to the beginning of the present century it was a generally received dogma in geology that the Mammalia had not been created before the Tertiary period; and the first discovery of the jaw-bone of a small Marsupial in the lower Oolite caused as much sensation as would now be excited by our finding a
Secondary monkey, or (we may add) a Silurian bird or mammal. The following table is abbreviated from that in the *Silliman Journal* (p. 315) as it is well calculated to show how scanty and accidental is our knowledge, and how necessarily imperfect must be the geological record in still earlier periods.

<table>
<thead>
<tr>
<th>Number and Distribution of Fossil Mammals from Strata older than the Tertiary</th>
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<tr>
<td><strong>Secondary Strata</strong></td>
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<tr>
<td>Maestricht chalk</td>
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<tr>
<td>White chalk</td>
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<td>Chalk marl</td>
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<td>Upper Greensand</td>
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<td>Gault</td>
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<td>Neocomian (Lower Greensand)</td>
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<td>Wealden</td>
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<td>Upper Purbeck Oolite</td>
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<td>Lower Purbeck Oolite</td>
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<td>Portland Oolite</td>
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<td>Kimmeridge clay</td>
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<td>Coralline clay</td>
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<td>Oxford clay</td>
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<td>Great Oolite</td>
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<tr>
<td>Inferior Oolite</td>
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<tr>
<td>London Clay</td>
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<tr>
<td>Lower Tras (Somerset, S Carolina)</td>
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<tr>
<td>Middle Tras</td>
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<tr>
<td>Primary Strata</td>
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<td>Permian</td>
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<td>Carboniferous</td>
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<td>Devonian</td>
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<td>Silurian</td>
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<td>Cambrian</td>
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<td>Laurentian</td>
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For an account of the characteristics of these small animals, and for some details of their history, we refer the reader to Sir Charles Lyell's work, it is here only necessary to state the circumstances under which these remains have been preserved and discovered. Fossil remains of land animals are, of course, rarely found except in lacustrine or estuarine deposits, and these are often entirely wanting throughout extensive geological formations. But even when such fossiliferous beds occur, the condition favorable to the preservation of plant remains is exceedingly rare—the entire series of fresh-water Wealden beds having yielded no trace of them, although we are quite certain that they were then both varied and abundant. Even more remarkable is the fact that the whole 25 species of Purbeck mammals, belonging to 10 genera, were obtained from a single stratum only a few inches thick, and from an area of less than 500 square yards. Yet these small animals must have abounded at this period; and it is impossible to believe that anything but a most imperfect and fractional representation of the mammalian fauna of the country could have been gathered into this narrow graveyard. But this thin stratum occurs amid a mass of fresh-water deposits 100 feet thick, the whole of which have been thoroughly and systematically examined by the officers of the Geological Survey of Great Britain, and though many of the layers contain remains of land organisms—plants, insects, and land-shells—no other part of the whole series has yielded a single fragment of mammalian remains! Having this striking example of the worthlessness of negative evidence, it behoves us to be cautious of rejecting any legitimate conclusions from the facts in our possession, on account of the absence of the direct evidence of fossil remains. The varied and highly-developed Mammalia of the Eocene period really necessitate (to the evolutionist) the long-continued previous existence of this class of animals, and the discovery of isolated species in the Oolite and Tras would (had it been delayed to our time) have been but a confirmation of theoretical deduction.

In his anniversary address to the Geological Society in 1870, Professor Huxley adduces a number of special cases showing that, on the theory of development, almost all the higher forms of life must have existed during the Palaeozoic period. Thus, from the fact that almost the whole of the Tertiary period has been required to convert the ancestral *Orkippys* into the existing horse, he believes that, in order to have time for the much greater change of the ancestral Ungulata into the two great divisions of Perissodactyles and Artiodactyles (of which change there is no trace even among the earliest Eocene Mammals), we should require a large portion, if not the whole, of the Mesozoic period. Another case is furnished by the bats and Cetacea, which occur fully developed in the Eocene formation, and these would have required still more time for their modification out of ancestral Insectivora and Cetacea. The Marsupials of the Tras, again, were already differentiated into herbivorous and carnivorous forms, so that on the lowest estimate we must place the common ancestor of the Mammalia, very far back in Palaeozoic times. Reptiles furnish evidence of the same character. Professor Huxley says, "If the very small differences which are observable between the *Crocodilia* of the older Mesozoic formations and those of the present day furnish any sort of approximation towards an estimate of the average rate of change among the *Saurapoda*, it is almost appalling to reflect how far back in Palaeozoic times we must go before we can hope to arrive at that common stock from which the *Crocodilia, Lacertilia, Ornithodectidae,* and *Pterosauroidea,* which had attained so great a development in the Tertiary epoch, must have been derived." And if to these indications we add the appearance of two orders of fishes—Elasmobranchs and Ganoids—in the Silurian period, we shall be compelled to place the origin of the whole vertebrate stock at an epoch far beyond that of the lowest fossiliferous rocks of the Cambrian series.

It, then, we bear in mind the very early appearance of so many highly complex organisms, representing all the great types of animal life—almost all the great invertebrate groups in the Cambrian and Lower Silurian, with many Vertebrata and almost all forms of Insecta in the Devonian and Carboniferous periods,—while a large number of these have gradually increased in complexity of organization down to our times, we shall be prepared to admit the extreme probability of Mr Darwin's view, that "before the lowest Cambrian stratum was deposited, long periods elapsed, as long as, or probably far longer, than the whole interval from the Cambrian age to the present day; and that during these vast periods the world swarmed with living creatures" (*Origin of Species*, 6th ed. p. 286).

Professor Ramsay has recently expressed analogous views, founded on an extensive survey of the whole series of geological formations. In a paper on the comparative value of certain Geological Ages (or Groups of Formations) considered as items of Geological Time" (*Proceedings of the Royal Society*, 1874, p. 334), he says—speaking of the abundant and well-developed fauna of the Cambrian period, a sketch of which we have given at p. 282—"In this earliest known period of life we find no evidence of its having lived near the beginning of the zoological series. In a broad sense, compared with what must have gone before both biologically and physically, all the phenomena connected with this old period seem, to my mind, to be of quite a recent description; and the estimates of sea and land were of the very same kind as those the world enjoys at the present day."
DISTRIBUTION

It thus appears that the general geological principle with which we started, of the more complete destruction by desolation and metamorphism of the earlier as compared with the later records of life upon the earth, receives ample support in the apparently sudden appearance of whole groups of complex and specialized forms in some of the earliest rocks; while the general imperfection of the geological record is made manifest by such facts as the very few and isolated remains of Mammalia in the Mesozoic rocks, although we know they must have existed in abundance throughout the whole Secondary and much of the Paleozoic periods. The great lesson we have to learn from the facts of palaeontology is, that its negative evidence is at the best of but little value; but when this negative evidence is opposed to general principles established upon a wide basis of physical and biological research, it becomes absolutely worthless. Just in proportion as the series of fossiliferous deposits is more complete, and the fossil remains more abundant and varied, does the evidence for evolution and progressive development become more powerful. The difficulties are almost wholly dependent on incomplete knowledge, and on the assumption (which we have endeavored to show is entirely unfounded) that the earliest traces of the fossil remains of any animal type which have been discovered can give, even approximately, the period of its first appearance upon the earth.

We find, then, that just as a study of the distribution of animals in space enables us to learn much of the immediately preceding condition of the earth's surface, and especially of the recent changes of land and water,—so a study of the distribution of animals in time, when aided by the modern theory of evolution, gives us some knowledge of the physical condition and life of the earth in times beyond the reach even of geological history. (A. R. W.)

DISTRIBUTION OF VEGETABLE LIFE.

The literature in which the immense multitude of distinct kinds of plants which are dispersed over the earth's surface and form its vegetation has so far been described has necessarily been adapted to the divisions of political geography. The causes which have brought about the formation of such divisions have rarely, however, had anything in common with those which have determined the characteristic features, whether superficial or profound, of the floras of different countries. The vast mass of catalogues and descriptive enumerations of the plants of such countries, the boundaries of which are for the most part quite artificial, are therefore ill adapted for bringing out any general conclusions as to the mode in which plants are distributed. It is only by making some kind of analysis of the often heterogeneous contents of such catalogues, and piecing together the results obtained from different sources, that any clue can be obtained to the approximate lines of demarcation of floras which are really naturally limited and characterized. The process is, however, enormously laborious, and, even apart from that, must for a long time to come be exceedingly imperfect in its application, owing to the immense tracts of land—and those with the most varied and copious vegetation—of the natural products of which our knowledge is still most defective.

Numerous attempts have, however, been made, notwithstanding the difficulty of the task, to map out the earth's surface into "regions of vegetation." The real significance of these regions will, of course, entirely depend upon the principles which have been relied upon in forming them. And in this respect the progress of geographical botany has been exactly similar to that of classification. The characteristic distinctions which were first seized upon in either case proved on closer scrutiny to be superficial, and to bring about merely artificial and arbitrary assemblages. The doctrine of evolution has in fact effected the same revolution in both; it has shown in the one that community of descent is the real meaning of a natural classification, it has shown in the other that community of origin is the real key to geographical distribution.

Most of the writers on geographical botany have been content to set aside all considerations of origin and history in attempting to define the limits of botanical regions. They have not attempted to see in the peculiar features which such regions may possess anything more than adaptations to physical conditions working on plants created in great measure where they are found. Although, therefore, the literature of geographical botany has been useful in enabling the reader to realize the local features—the colouring, if one may so express it—of particular countries, the facts have hitherto been presented in a form void of any true significance. And these remarks apply to the system of Schouw (1858), which has been much employed, particularly to that of De Candolle, and conspicuously to that more recently published by Grisebach. It is to the writings of Darwin, Hooker, Asa Gray, and Bentham that we must look for a real insight into the origin and dispersion of floras, and for the real causes of the existing distribution of plant life.

The first attempt to review the whole subject of plant-distribution from the modern point of view afforded by evolution is due to Bentham, who made it the subject of a presidential address delivered to the Linnean Society in 1869. Bentham's conclusions are based upon the experience of a long life devoted to systematic botany, and will probably always hold a fundamental position in the study of the subject, at any rate for some time to come, until the distribution of a large number of subordinate groups has been carefully worked out, the main points established by him are not likely to be materially modified.

The general fact of vegetation is obviously largely affected by purely physical causes. In the polar regions, arboreal and even shrubby plants become incapable of existence, and only small perennials which are safely covered up by snow during the long winter are able to come into bloom the brief summer to expand their flowers and ripen their seeds. Putting aside for the moment the severances effected by large bodies of water and mountain chains, it is easy to see that the vegetation of the earth must have always been separable into three great latitudinal zones, two belonging to the north and south hemispheres respectively, and one dividing them lying between the tropics. The constituents of the vegetation of these zones must always have had a certain homogeneity; very considerable divergences, however, have grown up within the zones themselves, owing to circumstances of geographical isolation. Even without these, distance alone, independently of isolation, would in time be sufficient to effect it. It is also obvious that the precise northern and southern limitations of such hypothetical zones must have varied with secular changes in the earth's climate, and when these changes have taken place over a broken configuration of land and sea, the intermixture of diverse floras must necessarily have become very complicated.

Underlying, however, the tangled fabric of the earth's existing floral covering, we may agree with Bentham in recognizing the existence of three tolerably ancient floras—the Northern, the Tropical, and the Southern. I. The Northern is characterized by its needle-leaved Coniferous, its catkin-bearing Amelanchier and other forest

1 Presidential address to Linnean Society, 1869, p. 18.
trees deciduous in winter, and its vast assemblage of herbaceous types, Ranunculaceae, Cruciferae, &c. These spread over Europe, northern and central Asia, and great part of North America.

II. The Southern is broken up into numerous divergent floras. Their original connection is now traceable only in the common possession by two or more of them of large characteristic groups, such as Restiaceae, Proteaceae, Dioscoreae, &c., the subordinate divisions of which have been locally specialized. To this belong the floras of extra-tropical South America, South Africa, and Australia with New Zealand, to which must probably be added an area borrowed from the northern hemisphere in Mexico and California.

III. The Tropical is characterized by the predominance of mostly evergreen arboreous Polygalaceae (Anoureae, Meliaceae, Leguminosae, &c.), and gigantic Monocotyledons, of which Palms, Saliceae, and Bombacæ among grasses are especially striking.

1. The Northern Flora.—This has been long divided into two, Old and New World by the severance of North America from northern Asia, and by the barriers which interchanged vegetation in the upvalley of the Rocky Mountain range. Nevertheless its marked continuity (with only a gradual east and west change in the arctic regions, but an increased divergence southwards) requires it to be treated as a whole. The Old and New World divisions of this flora, which, no doubt, began to diverge from the mere influence of distance, have now had that divergence immensely increased by isolation. According to Lesquereux, the essential types of the present arboreous flora of North America are indicated in the Cretaceous rocks of that country, and become more distinct and numerous in the Tertiary, and he believes that the origin of the existing American flora is American. The analogy between the Miocene flora of Central Europe and the present North American flora is unquestioned, and is greater than between the same fossil flora and that now existing in Europe.

Lesquereux's conclusion is that the American element in the vegetation of Miocene Europe was adventive, and this is one of many illustrations of the curious observation of Asa Gray that plants have in general a greater tendency to migrate from east to west than from west to east. The Miocene flora was, however, gradually driven back again, and it is only as we travel from Europe to the East that we gradually find its tracts getting stronger and stronger. Thus, as Oliver has pointed out, in passing from the Mediterranean to the Levant, the Caucasus, and Persia, we get through the Transcaucasion, Aral, and Caspian seas, and up to the Levant, the Miocene genera Chamissoa, Platania, Lycium, Pterocarya, Juglans, &c. Along the Himalayas and through China we trace other Miocene genera, Japan forming part of the same botanical region as Eastern Asia. Among the remarkable existing North American types which may be mentioned as reappearing in the Himalayas and Japan are Aralia, quinquefolia, Phryma leptostachyra, and Tsillium erecta.

One of the most interesting additional facts which has recently come to light is the occurrence of a species of tulip tree (Liriodendron) in Central China, which genus, though a member of the European Miocene flora, has in recent times been regarded exclusively characteristic of America. With respect to other American genera which are not necessarily part of the Miocene flora, the same general principle holds good. Bentham remarks, that while some, like Astragalus, have multiplied largely in both continents, "other genera, like Eupatorium, Aster, Philo, Solanum, &c., very num-

1 Geologic Survey of Missouri, 1871, p. 314
2 Nat. Hist. Rev. 1862
3 Missouri Journ. of Sci. 1875, p. 225

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rously represented in America, have transmitted or produced a smaller number in Eastern Asia, gradually diminishing eastward till they disappear altogether or attain Western Europe in single species but little altered from American ones. The European-Asian genera, on the other hand, such as Cruciferae, Umbelliferae, &c., which are so dominantly a feature in the existing Old World Northern flora, appear "to have left but few representatives in America, and those much more modified than the American races left in Asia." Besides the internal migrations of the various constituents of the great Northern flora, its boundaries have been changed longitudinally under the influence of secular variations of climate alluded to above. The nature of these cannot be better summed up than in the words of Bentham—

"Where the chief portion of this great northern flora originated, and whether it may be best termed Scandinavian, or North American, or Caucean, is a question for the determination of which we have little or no data, but, as observed by Hooker, it is probably one of the most ancient and widest spread, having at different epochs travelled over a great part of the globe. Shown by the resemblance of Lesquereux, as well as by the recent ones of Heer and atlas, to have extended far north during the warmer glacial times, where they have been slowly driven southwards as the glacial epoch came on, and then either, or at some one or more other periods, have been for a time continuous, in two lines at least, into the southern hemisphere, for it has left traces still discernible, especially in its arboreous and mountainous forms, in the mountains of tropical Asia, down to at least the Indian peninsula, and westward to the Abyssinian and Cameroon mountains of Africa, and, again, down the Andes to the extreme south of America, where it is still abundant, and in a less degree in New Zealand, Tasmania, and Victoria. In all these migrations, whilst retaining a general identity, the flora must have undergone continual changes, losing species or other races of limited areas and propagation as their habitats became limited for them, and gradually forming new ones when favoured by longitudinal isolation or other requisite conditions."

The Northern flora has further undergone a specialization into three secondary floras, due to the combined influence of physical and genetic causes.

1. The Arctic-alpine flora ("consisting chiefly of plants of small stature, slow growth, and limited means of dispersion, compensated by long lives and great powers of endurance") is perhaps the most interesting of the three subdivisions, both because in its arctic aspect it reduces the divergences of the Old and New World divisions of the Northern flora to a minimum, and more especially on account of the great interest which attaches to the problem of its scattered alpine outliers. With regard to the first point, Hooker found that estimating the whole Arctic flora at 762 species, Arctic East America possessed 379, of which 263 were common to Scandinavia. Of the whole flora 616 species are found in Arctic Europe, and of these 586 are Scandinavian, and this leads Hooker to the striking observation that "the Scandinavian flora is present in every latitude of the globe, and is the only one that is so." Christ objects to Hooker's giving the title of Scandinavian to the Arctic flora, but we must agree with Bentham that Scandinavus "world, according to older rules, have been regarded as the centre of creation for the arctic lands, and may now be termed the chief centre of preservation within the arctic circle, owing perhaps partly to its more broken conformation, and partly to that warmer climate which, while it now admits species which Christ objects to being included in the Arctic flora, was during the glacial period a means of preservation of some colder species which were everywhere else expelled or destroyed."

Just as at present the Arctic is more homogeneous than..."
the more southern divisions of the Northern flora, so we may infer that towards the close of the Tertiary epoch the continuous circumpolar land was covered with a vegetation also largely composed of identical plants but adapted to a warmer climate. As the climate became less warm there would commence a migration southwards, which would result in the modified descendants of these plants being now blended with the vegetation of Central Europe and the United States.

As the glacial period gradually advanced, the tropical plants and animals will have retreated from both sides towards the equator, followed in the rear by the temperate productions, and these by the arctic." When the climate of the earth again ameliorated, the migration took place in the reverse direction, and in this way mountain ranges became the havens of refuge of fragmentary species of plants, which were wintered over on the lowlands. Even the equatorial region ceased to be a barrier during the glacial period, and to migration at that time must be attributed the survival of arctic forms in the southern temperate zone. The southern migration of the Arctic flora does not appear to have taken place in one continuous wave. Thus, as Bentham points out, many facts showed separate communications between the north and each of the three chains of the Pyrenees, the Alps, and the Himalayas, whilst these gave little evidence of any lateral communication of their respective arctic vegetation. The fact that the migration southwards and remigration northwards of the Arctic flora took place along parallels of longitude, accounts for some of its existing peculiarities. Hooker explains in this way the comparative poverty of the Greenland flora.

If it be granted that the polar area was once occupied by the Scandinavian flora, and that the cold of the glacial epoch did drive this vegetation southwards, it is evident that the Greenland individuals, from being confined to a peninsula, would be exposed to very different conditions to those of the great continents. In Greenland many species would, as it were, be driven into the sea, that is exterminated; and the survivors would be confined to the southern portions of the peninsula, and not there being brought into competition with other types, there could be no struggle for life amongst their progeny, and consequently no selection of better adapted varieties. On the return of heat, these survivors would simply travel northwards unaccompanied by the plants of any other country.

"In Arctic America and Asia, on the other hand, where there was a free southern extension and dilatation of land for the same Scandinavian plants to occupy, these would multiply enormously in individuals, becoming numerous species and sub-species, and occupy a larger area the further south they were driven, and none need be altogether lost in the southern migration over plains, though it would be in the extremity of the plants which caused them when they reached to the mountains of those continents and were brought into competition with the alpine plants, which the same cold had caused to descend to the plains. Hence, on the return of warmth, many more Scandinavian species would return to Arctic America and Asia than survived in Greenland; some would be changed in form, because only the favoured species could have flourished the stronger; some of the alpine Siberian and Rocky Mountain species would accompany them to the arctic zone, while many arctic species would ascend those mountains, accompanying the alpine species in their recessant.

The Arctic-alpine flora is obviously in its present condition a composite one. Portions of the Northern flora, probably originally very distinctly characterized, became adapted to the peculiar physical conditions of high mountain ranges and of the extreme north. The gradual deterioration of the climate brought the alpine flora, to the lowlands and the arctic flora southwards till they intermingled. When they again returned to their original territories they were so far changed that each gave to the other some new members, while both had experienced many losses.

A de Candolle has very ingeniously applied the general principles laid down above to the detailed explanation of the distribution of the flora of the Alps themselves. The following is a brief summary of his conclusions:

1. The valleys and groups of mountains which have at present a maximum of rare species and the most varied flora belong to districts on which the glaciers disappeared earliest. On the other hand, where the duration of snows and glaciers has been longest, the existing flora is poor. From a variety of causes which A. de Candolle enumerates, it seems probable that the southern and eastern glacers of the Alps were of smaller extent than the northern, and would consequently be the soonest to retreat. We have consequently the curious fact that some of the most ancient fragments of the alpine flora are now only to be found on the southern slopes of the Alps. Thus is the case with species of Primula, Polemonium, and Dryas, which exist neither in the interior of Europe and Asia, nor in the Himalayas, nor in the Pyrenees. The valleys and of the extreme north. The gradual

2. The Intermediate or Temperate flora is best described in the words of Bentham as "A mongrel vegetation of mixed origin, including a large proportion of species of the most extended geographical range, with a very few local ones, and those chiefly in the extreme west. The majority, whether trees, shrubs, or herbs, are plants of comparatively rapid growth, very prolific, endowed with great facilities for dispersal, and constitutions capable of adapting themselves to a great variety of physical and climatological conditions. They are the commonest plants of the world, appearing in all kind of soils, and under almost every kind of aspect and conditions. The species tend to multiply rapidly, and to spread and become abundant. The vegetation is, moreover, generally continuous, that is, interrupted only by intervals which under present conditions they have means of crossing, and they are abundant in individuals, ascending in latitude and elevation, or descending to the south, when checked in their career by competing species, better enabled to endure the increasing rigour or the searching drought of the respective climates. Many of them, at this time, are or have been subject to slight modifications suited to their exceptional circumstances, and it is them as difficult to separate them from the genuine northern or southern flora as in many cases to give plausible grounds for the existence of individual species."

3. The peat deposits of Denmark tell an unmistakable tale of the gradual advance of successive waves of vegetation from the south-east. The Scotch fir was once abundant within

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3. Martens, however, considers that many of the plants of the existing south of Europe flora are of great antiquity in their present situations; thus the Olearia (Vernum Olearia) has been found in deposits from the Zocone uplands (Mon. de l'Acad. Sc. de Memphilet, ix p. 95).
the Roman period in the Danish islands, but is now extinct; it was succeeded by the seashore-fruited oak, to be in turn supplanted by the pedunculated form of the same tree, associated with the elder, birch, and hazel. The oak is now almost supplanted by the beech. According to Areschoug, the original post-glacial flora of Scandinavia has retreated to the north, and is probably still retreating, while the flora of central and southern Scandinavia consists of an eastern and northern-eastern vegetation, which spread into Europe after the glacial period and before the beech tree had invaded Sweden, with the admixture of more southern species, which, with the beech, have since penetrated into Sweden through Denmark. The beech and the chestnut occur in Japan, and, as far as Europe is concerned, there is good reason to regard their origin as Eastern.

As already pointed out, the American element in the European flora suffered severely during the glacial period, and has never since recovered itself. Japan, however, appears to have retained a great centre of preservation, and hence the numerous points of contact which its flora presents with that of the North American continent. In the New World itself, the continuity of the pre-glacial and post-glacial temperate floras has been better preserved. The following passage from an address of Aas Gray's may be quoted giving its history in a concise form:

He "conceived that the present vegetation or its proximate ancestry must have occupied the arctic and sub-arctic regions in Pliocene times, and that it had been gradually pushed southward as the temperature ascended, and glaciation advanced, even beyond its present habitation, that plants of the same stock and kindred probably ranging round the arctic zone as the present species do, made their forced migration southwards upon widely different longitudes, and receded more or less as the climate grew warmer; that the general difference of climate which marks the eastern and western sides of the continent,—the one extreme, the other moderate,—was doubtless even then established, so that the same species and the same sorts of species would be likely to secure and retain foothold in the similar climates of Japan and the Atlantic United States, but not in intermediate regions of different distribution of heat and moisture, so that different species of the same genus, as in Torreya, or different genera of the same group as red-wood, Lasiodendron and Gleditschobus, or different associations of forest-trees, might establish themselves each in the region best suited to the particular requirements, while they would fail to do so in any other."

The west of Europe possesses the remains of a local and probably ancient flora of very great interest, characterized by Gorse, and allied shrubs Lygeum, Heathia, Lobelia, Sibbaldiopsis, &c. These are closely checked in any tendency towards eastern dispersion by the severity of the winter climate away from the ameliorating influence of the sea. The probability of a southern extra-tropical connection of this peculiar element in the Northern flora will be adverted to hereafter.

The flora of the British Isles is in many respects interesting; it is in its main features an extension of the Germanic area of the temperate flora with the presence of the western element above alluded to distinctly marked on the south-western coast. Barcanum septangulare is an annual limited to Ireland and a few islets on the western side of North Britain, and being otherwise an American and not a European species. Its presence can hardly be explained except by the agency of migratory birds.

3. The Mediterranean-Caucasian flora, like the Arctic-alpine, contrasts in the most marked way with the temperate.

By far the richest and most diversified in species [it comprises six-sevenths of the European flora], it is also remarkable for the great variations centering round individual types, as well as for the very restricted areas occupied by a number of the most marked species; the limits are not to be accounted for by any physical peculiarities we are acquainted with, nor perhaps to be otherwise explained than by a supposition of very great antiquity.

Eastward of the Caucasus this remarkable flora dies away, reaching its eastern limit in Scinde, and the temperate flora of Asia is only separated from the tropical by the Himalayas. Southwards its progress is arrested by the arid zone formed by the African and Arabian deserts. As in the case of the Arctic flora, traces still exist of its former southern extension under the influence of a colder terrestrial climate. Adenocarpus, a characteristic Mediterranean genus, is represented by an identical species on Kilima Njaro, near the equator, and on the Cameroons mountains, 2000 miles distant on the opposite and western side of the African continent.

4. The Australian flora is "almost endemic, showing some slight connection with the New Zealand, and a few remains of former ramifications northward to some parts of the Indian Archipelago, a very few species, perhaps of modern introduction, extending to China and Japan; Bentham conclusively dismisses Unge's theory of the former extension of the Australian flora into Europe in Eocene times.

5. The Andine flora, characterized by a large number of distinct genera, Fuchsia, Gaultheria, Calceolaria, ranges more or less along the whole chain, "penetrating far northwards in Western America, throwing off a few branches into Eastern Asia, and at its southern extremity crossing over to New Zealand, and in smaller numbers to Tasmania, and the mountains of Victoria."

6. The Mexico-Californian flora is "represented at great distances by closely allied species of small distinct genera—in Mexico and California, in the Argentine states, and in S. Africa or Australia."

7. The S. African flora is "perhaps the richest known in proportion to its extent, and remarkably varied within its narrow limits." Its connection with other floras is very slight. That with Australia, alluded to at the commencement, does not extend beyond groups of the highest order (in the Proteaceae not merely the species but the genera

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1. Lyell, Antiquity of Man, p. 9.
2. Bentham, i. e. p. 29.
have become geographical; and, as mentioned above, there are a few scattered species, representing the South African flora, in extra-tropical South America. There are, however, two offshoots in a northern direction. The remarkable West European flora, already referred to, possesses species of Erica shrubby Leymus gracilis, Lobelia, Gladiolus, *etc.*, "more nearly added to corresponding Cape species than they are to each other." The other extension is to Eastern Africa. The sub-alpine vegetation of Kilima Njaro is distinctly South African, and Hooker suggests "the probability of the South African flora being represented all along the highlands of Eastern Africa, from Natal to Abyssinia; and further, seeing that most of the South African plants found in the Cameroons are also natives of Abyssinia, it would appear probable that the migration of these to the Cameroons was by and through Abyssinia." The further suggestion that this may have been the path travelled by the West European extension of the African flora of tropical India and, as a matter of fact, that agreement amongst these scattered fragments of a great flora points necessarily to a state of things when the lands they now occupy were at one time or other in more or less of intimate connection. The amount of difference between the floras, and the fact that agreement has to be sought in groups of high rather than of small rank, points equally to the fact that such connections must have been far from recent. The detailed study of separate groups leads by another path to the same result, and, as a good instance of the new phase into which taxonomic botany is entering in the light of the study of geographical distribution, reference may be particularly made to Bentham's important investigation into the past history and migrations of the *Campanulaceae.*

III. THE TROPICAL FLORA.—This is still perhaps too imperfectly known to admit of any very plausible generalization. It obviously presents three great subdivisions.

1. The *Indo-Malay*—extends from the Himalayas to north-east Australia and Japan. In the latter country it meets the northern temperate flora, from which in India it is sharply divided by the Himalayas.

2. The *American* is a still perfect mine of unexplored botanical wealth. Bentham remarks—"No general comparison of Asiatic and American tropical vegetation can therefore be made without immense labour of detail. As far as we know, however, the resemblance between them is only in some of the races of a higher grade, natural orders and comprehensive genera; the smaller genera and species, and many even of the higher ones, are totally different; or if a few species are identical, they are generally, if woody or aropeous such as *Enantia*, *Dioscorea*, *etc.*, wholly or partially maritime, and may have traversed the ocean during its present configuration, or if herbaceous widely, spread weeds still more likely to be spread all round the tropics under existing conditions." There are, however, some extraordinary points of connection between the flora of the newly discovered New Worlds, to which there is at present scarcely any clue. Thus *Ternstroemia emarginata*, endemic to Ceylon, so closely resembles the Brazilian *Ternstroemia ecuadensis* as to be barely distinguishable.

3. The *African* tropical flora is probably the most imperfectly known of any. Bentham considers it as of great antiquity, and as having preserved large numbers of persistent types from which races "have widely diverged in Asia or America, or in both." He further remarks that "as our knowledge of the vegetation of tropical Africa has increased, we have discovered a greater number of Asiatic types; but still there are, even in the interior, a certain number of American ones, offering a problem the solution of which has scarcely been attempted." In *Cannabis* American genera are represented in east tropical Africa, and Bentham is led on various grounds to regard this as the principal area of preservation of the most ancient tropical flora of the Old World. A well-marked eastern element in the African tropical flora is generally accepted. Madagascar, whose flora bears the marks of long isolation, contains Malayan and even Australian types; and it is a problem worth future inquiry whether the connection between the floras of tropical Madagascar, Asia, and America may not have taken place south of the tropics, and by similar (though more southern) paths to those which once united the scattered members of the great Southern flora.

As might have been expected, during the Tertiary period the tropical flora extended much beyond its present limits. De Saporta, who has studied with great caution the fossil flora of the gypseous beds (Eocene) of Aix in Provence, arrives at the following conclusions. The principal families were such as characterize tropical vegetation, especially Indian—*Ebenaceae*, *Anacardiaceae*, *Sapindaceae*, *Sterculiaceae*, *Leguminosae.* The affinities of the ancient vegetation of Aix in respect of generic types, general facies, and composition with that of India and the Indian archipelago, China, the Philippines, and Japan at the present day, are in perfect accordance with the theory that these regions formed the shores of our ancient nummulitic sea, extending from Morocco to Japan, and entirely comprised in the tropical zone of the Eocene world, which extended to the 50th parallel. Besides its relation to South-Eastern Asia, the Aix flora exhibits, according to De Saporta, a strong affinity with that of Africa, lying between Abyssinia and the Cape, of which, however, it must be confessed, but little is as yet known.

Here this outline of the present state of a most important and rapidly developing branch of biological science must be concluded. The writer has availed himself very freely of the kind permission of Mr Bentham—perhaps the greatest living master of the subject—to make use of his scattered but invaluable papers, not scrupling to borrow from them all that seemed most important and suggestive, but has generally thought it fairer both to the subject and to Mr Bentham to do so in his own words. For two heads of the subject it must suffice merely to give references. On the remarkable phenomena of insular floras, the reader should consult Sir Joseph Hooker's well-known lecture delivered before the British Association in 1866; and, printed in the *Gardeners' Chronicle* for January 1872, or, in default of this, the summary given in Lyell's *Principles of Geology,* 10th ed., vol. ii. pp. 417-421. On the means of dispersal of plants, reference may also be made to Lyell's *Palaeontology,* pp. 386-400, Darwin's *Origin of Species,* 4th ed., pp. 455-445; Bentham, *Presidential Address,* 1869, pp. 7, 8. [W. T. B.]
DITHMARSCHEN, or DITMARSH, in the oldest form of the name Thamarcar Dio, Dietmar's Gau, a territory between the Elster and the Elbe, forming the western part of the old duchy of Holstein, and now included in the Prussian province of Schleswig-Holstein. It was originally colonized mainly from Friesland and Saxony,—the Frisian kindred of the Vogelmann settling on the coast and giving rise to the two marks of Norderland and Suderland, and the Saxon kindred of the Woldsmen settling inland and forming the two marks of Norderhamme and Suderhamme. The district was subjugated and Christianized by Charlemagne in 804, and ranked as a separate Gau, included perhaps in the countship of Stráde, or Comitatus astragae ripe. From the same century, according to one opinion, or from the year 1180, when the county was incorporated with their sea, according to another, the archbishops of Bremen claimed supremacy over the land; but the inhabitants, who had developed and consolidated a systematic organism for self-government, made obstinate resistance, and rather attached themselves to the bishop of Schleswig. The Danish king Eric or Sweyn succeeded in defeating them, and Dittmarser, to use the Scandinavium form of the name, continued part of the Danish dominions till the disastrous battle of Bornhöved in 1227, when its former independence was regained. The claims of the archbishop of Bremen were now so far recognized that he exercised the royal rights of Heerhann and Holliamn, enjoyed the consequent emoluments, and was represented first by a single advocatus, or Vogt, and afterwards by one for each of the five Duffs, or marks, into which the land was divided after the establishment of Mecklenburg. The community was governed by a landrecht of forty-eight elective canons, or twelve from each of the four marks, and even in the 14th century the power of the episcopal Vogt was so slight that a chronicler of that date, quoted by Maurer, says, De Ditmarischen essen under eiren et Hoved unde eihert wol alle will, "the Ditmarsschen live without lord and head, and do what they will." In 1310 and in 1414 they succeeded in defeating the invasions of the Holstein nobles, and though in 1474 the land was nominally incorporated with the duchy by the emperor Frederick III., the attempt of the Danish king Hans and the duke of Gottorp to enforce the decree in 1500 resulted only in their complete rout in the marshes of the Dussend-Duwels-Warf. During the early part of the century which began with such prestige for Dittmarsh, it was the scene of violent internal conflict in regard to the religious questions of the time, and, thus weakened, it was obliged in 1559 to submit to partition among its three conquerors—King Frederic III. of Denmark and Dukes John and Adolphus. A new division took place on Duke John's death in 1581, by which Frederick obtained South Dittmarsh, with its chief town of Hede, and this arrangement continued till 1773, when all the Gottorp possessions were incorporated with the Danish crown.

DIU, an island and small seaport on the south coast of the Kathiwar peninsula, in the province of Guzerat, in India. The Portuguese obtained possession of the island in 1515, and have held it ever since. Diu town is situated at the eastern extremity of the island, in 20° 43' N lat and 71° 5' E long. The anchorage is fairly protected from the sea, but the depth of water is only 3 to 4 fathoms, and is said to be decreasing. The channel between the island of Diu and the mainland is navigable only by fishing boats and small craft. The town is well fortified on the old system, being surrounded by a wall with towers at regular intervals.

DIUERTICS (from δία, through, and οἶψις, to pass urine) are remedies which, under certain conditions, produce an increased flow of urine. Their mode of action is various. Some, as tartar emetic and antimony, are absorbed into the blood, are carried to the secretory organs (the kidneys), and stimulate them directly, causing an increased flow of blood to them; others act as stimulants through the nervous system. A second class act in congested conditions of the kidneys by diminishing the congestion, this is supposed to be one of the modes of action of digitals. Another class, such as the saline diuretics, are effectual by virtue of their osmotic action. A fourth class are diuretics by increasing the blood pressure within the vessels in general, and the Malphigian tubs in particular,—some, as digitals, by increasing the strength of the heart's contractions, and others, as water, by increasing the amount of fluid circulating in the vessels. Some remedies, as mercury, although not diuretics themselves, when prescribed along with those which have this action, increase their effect. The same remedy may act in more than one way, e.g., alcohol, besides stimulating the kidneys, acts as a stimulant to the circulation, and thus increases the pressure within the vessels. It is stated above that remedies have a diuretic action under "certain conditions." These relate to—1st, the state of the kidneys themselves; 2d, the condition of other organs, 3d, the surroundings of

3 That is, the right of claiming military service, and the right of bringing capital offenders to justice.
the patient; 4th, the dose and mode of administration of the remedy. In illustration of each of these—1st, a dose of caustics, which in a patient with the kidneys healthy would be diuretic, would in one with the kidneys acutely congested have the reverse effect; 2d, if there were much irritation of the gastro-intestinal tract, acid tartrate of potash, instead of producing diuresis, would probably cause diarrhœa; squills would induce vomiting, digitals either diarrhœa or vomiting; 3d, Mínerous spirit, if taken by one exposed to an elevated temperature, would probably produce sweating, but if the temperature were low and the patient cool its action would be diuretic; 4th, many salines which in small doses are diuretics in larger doses are laxative; digitals if too long continued diminishes the flow of urine, irritant diuretics in too large doses diminish or altogether arrest it. Diuretics are indicated when the quantity of urine is much diminished, or when, although the quantity may be normal, it is wished to relieve some other organ or set of organs of part of them ordinary work, or to aid in carrying off some morbid product circulating in the blood, or to hasten the removal of inflammatory serous exudations, or of dropical collections of fluid.

DIVAN, or DIVAN. See Mohammedanism.

DIVER, a name that when applied to a bird is commonly used in a sense even more vague than that of Loon (q.v.), several of the Sea-Ducks, and Sisters (q.v.) being frequently so called, to say nothing of certain of the Auks or Alcides and Grebes (q.v.); but in English ornithological works the term Diver is generally restricted to the Family known as Colymbidae, a very well-marked group of aquatic birds, possessing great, though not exceptional, powers of submergence, and consisting of a single genus Colymbus (or Loon of some writers) which is composed of three, or at most four, species, all confined to the northern hemisphere. This Family belongs to the Cootiformes of Professor Huxley, and is usually supposed to occupy a place between the Alcides and Podicipedida; but to which of those groups it is most closely related is at present undecided. Professor Brandt in 1837 (Beitr. Naturforsch. Vogel, pp. 124-132) pointed out the osteological differences of the Grebes and the Divers, urging the affinity of the latter to the Auks, while thirty years later, Professor Alph. Milne-Edwards (Oeuvres, France, t. pp. 278-283) inclined to the opposite view, these differing in the similarity of a peculiar formation of the tarsus in the Grebes and Divers in that the former have a distinct and singularly-formed patella (which is undeveloped in the latter) in addition to the prolonged, pyramidally-formed, procumal process—which last may, from its exaggeration, be regarded as a character almost peculiar to these two groups. The evidence furnished by zoology and the newly-hatched young seems to favour Prof. Brandt's views; and, without according too much weight to such evidence, it certainly ought to be considered before a decision is reached. The abortion of the rectrices in the Grebes, while these feathers are fairly developed in the Divers, is another point that helps to separate the two Families; but until their morphology has been worked out nothing can be safely averred on the subject.

The commonest species of Colymbus is C. septentrionalis, known as the Red-throated Diver from an elongated patch of dark bay which distinguishes the throat of the adult in summer-dress. Immature birds want the bay patch, and have the back so much more spotted that they are commonly known as "Speckled Divers." Next in size is the Black-throated Diver, C. arcticus, having a light grey head and a gular patch of purplish-black, above which is a semicollar of white striped vertically with black. Still bigger is the Great Northern Diver, C. glacialis or torquatus, with a glossy black head and neck, two semicollars of white and black vertical stripes, and nearly the whole of the black back and upper surface of the wings beautifully marked with white spots, varying in size and arranged in belts. Closely resembling this bird, so as to be most easily distinguished from it by its yellow bill, is C. adamsi, the specific validity of which is not yet fully established. The Divers live chiefly on fish, and are of eminently marine habit, though invariably resorting for the purpose of breeding to freshwater lakes, where they lay their eggs; but the eggs (2 in number) are not unfrequently found far from the sea, being either driven inland by stress of weather, or exhausted in their migrations. Like most birds of their build, they chiefly trust to swimming, whether submerged or on the surface, as a means of progress, but once on the wing their flight is strong and they can mount to a great height. In winter their range is too extensive and varied to be here defined, though it is believed never to pass, and in few directions to approach, the northern tropic; but the geographical distribution of the several forms in summer requires mention. While C. septentrionalis inhabits the north temperate zones of both hemispheres, C. arcticus breeds in suitable places from the Hebrides to Scandia, and across the Russian empire, it would seem, to Japan, reappearing in the north-west of North America, though its eastern limit on that continent cannot yet be laid down; but it is not found in Greenland, Iceland, Shetland, or Orkney. C. glacialis, on the contrary, breeds throughout the north-eastern part of Canada, in Labrador, and in Greenland; while C. adamsi has been found in Scotland as well as in Norway, but the assertion seems to await positive proof, and it may be doubted whether, with the exception of Iceland, it is indigenous to the Old World, since the form observed in North-eastern Asia is evidently that which has been called C. adamsi, and is also found in North-western America; but it may be remarked that one example of this form has been taken in England (Proc. Zool. Society, 1859, p. 206) and at least one in Norway (Nyt Mag. for Naturvidenskaberne, 1877, p. 134).

DIVIDIVI, the commercial name for the astringent pods of Cæsalpinia coriaria, a leguminous shrub of the sub-order Cæsalpinioæ, which grows in low marshy tracts

1 By those writers the name Colymbus is generally used for what others term Podiceps.
2 The remains of Colymbus maximus, from the Missouri of Langy, described by this naturalist in the work just cited, seem to show it to have been a type of the Branta, but its specific character is unknown.
3 Garrod, in his tentative and chiefly myological arrangement of Birds (Proc. Zool. Society, 1874, p. 117), placed the Colymbus and Podicipedida under the Order (Andeformes) and another (Charadriiformes); but the artificial nature of this arrangement of this must be realied by the fact of his considering the other Families of the former Order to be Andeæ and Sphenææ.
DIVINATION. This term is used to mean the obtaining
knowledge of secret or future things by revelation from oracles or omens. The derivation of the word points to divine influence communicated through the soothsayer, much as the equivalent Greek term mantike refers to the utterances of the spiritually inspired or possessed seer, mantis. It is well seen from Cicero's treatise De Divinatione that in classic times theology not only included in its system all revelation by oracles, which clearly belongs to it, but also claimed possession of a variety of diviner's arts such as augury and astrology, on the ground that their signs were sent by the gods. On the side of the Stoics, it is there argued that if divination is a real art, then there must be gods who gave it to mankind, which proposition is met by the counter-suggestions that signs of future events may be given by nature without any god, or that there may be gods and yet they have not bestowed on man any such art as divination. The real point of the relation of divination to religion is touched in the division of it into two kinds, — artificial divination, by haruspication, prodigies, lightning, augury, astrology, and lots, as contrasted with natural divination, by dreams and prophetic oracles. On a great survey of such arts among mankind, it appears that oracles, &c., being taken as revelations made directly by spiritual beings, fail to be considered under headings treating of religion (see, e.g., Drazovolsky); but divining by such signs as the flight of birds or the falling of lots does not necessarily depend on the notion of intervening demons or deities.

One part of its position is well stated in the argument by which Cicero makes his Stoic defend it:—If frogs by croaking, and ozen by snuffing the air, can give us signs to forecast the weather, why should there not be omens in the fibres of a victim's entrails, or in thunderstorms? But the religious view which regards omens as divine signs seems to have been from very early ages blended with the naturalistic view, so that in a great part of the cases it is impossible to disentangle them, or even to say which is the original one. This will appear in the following brief summary of the principal methods of divination. Now that the diviner's art has all but perished, we moderns are able to look back upon its history, to see how its futile proceedings were suggested by mistaken analogy, and how the experience of ages, which ratifies and interchanges and destroys false fancies, is now reducing them to curious antiquarian relics.

The various "artificial" modes of divination for the most part rest evidently on the association of ideas in analogy and symbolical (see evidence in Taylor, Early Hist of Divination, p. 133; Primitiv Culture, vol. i. p. 117, &c.; see 78.) A tree planted at a child's birth, or any other plant mentally associated with a person, gives a sign by its blossoming or withering as to that person's health or death (Floss, Das Kind, vol. i. p. 71) So with the sticks set up by Polygemonas to show if a fish is in it, or the ancient art of entomology, or the amulet bone, which is spun as a teetotum to point out a thief (Polack, New Zealanders, vol. i. p. 270; Mariner's Tonga Islands, ch. xx.) This kind of fanciful association appears in sorcery, or casting of lots, a proceeding remarkably not only for its antiquity but for the frequency with which religions have adopted it as a means of obtaining divine guidance, from the ages when classic poets sang of Homeric heroes praying to the gods when they cast lots in Agamemnon's leather cap, or of Mopsus the sooth­sayer divining with sacred lots when the Argonauts embarked on their voyage (Homer, I., v. 175; Pindar, Pyth., iv. 338), and on until modern times, when the Moravians still resorted to solemn religious lots to determine difficult questions, such as the choice of wives.

Dio or astragali (hucklebones) have been used for the purposes of sorcery (see Suetonius, Tiburri, &c.; and tarmomancy, or fortune-telling by means of playing-cards, is still common. In ancient times omens were drawn from poets' verses, fixed on by chance, a practice well known as Sortes Virgilianae, from Virgil being often so consulted (see Smith's Dict. Gr. and Rom. Antig., art "Sortes"); and the Bible came to be afterwards so used for drawing lotsw, or "pricking for texts," this practice is still very usual in Germany (see Wuttke, Deutsche Volksbraue, 2 ed., p. 237.) The haruspication, or examination of entrails, by which Roman statesmen were (or pretended to be) guided in public affairs (see Cicero, De Div., ii. 12; Thuc. II. N., xi. 73), and scapulimancy, or the Tatar mode of divining by the cracks and lines in a shoulder blade (Lubbock, Origin of Civilization, p. 230), formerly known in England as "reading the spear-bone" (Brand, Popular Antiquities, vol. iii. p. 339), depended on imaginary symbolic associations, such as that cracks in opposite directions meant good and ill fortune, that the course of particular lines indicated the course of the consulter's life, &c. This sort of false analogy may be well understood by any one who will have the simlar art of palmistry, or divining by the lines of the hand, applied to his own future by a fortune-teller at a fair. Omens obtained by augury, or divining by the night and cries of animals, especially birds (as the name indicates), are as familiar among uncivilized races as they were in ancient Rome, their symbolism is apparent in such rules as that a hawk means victory, an owl's hoot is unlucky, and that a beast or bird on the right hand portends good, but on the left hand evil (Tylor, P. C., vol. i. p. 119). Another class of arts depend on the unconscious or half-conscious action of some person, often the diviner himself. Among these is the use of the well-known divining rod, which when held in the hands, dips to indicate a hidden spring of water, a vein of ore, or a buried treasure (Brand, vol. iii. p. 332; see Chevreul, De la Bayette Divinatoire, &c.) The use of this instrument remains in some districts of England, it is locally known as "dowser," whence no doubt the name of Dowserswivel in The Antiquary Similar in principle is the ancient conchomancy, or divining by a sieve held suspended, and giving its indications by turning. In later times this gave place to the ordeal by the Bible and key, where the book is suspended by a key tied in its words between the leaves and the key supported on two persons' forefingers, and the whole turns round to prove guilty some servant maid accused of theft (Brand, vol. iv. p. 351.

In such cases, where the culprit's fears are apt to betray them, the process of divination really sets forth a sort of test. Dreams are not considered visits from ghosts, but often also as supernatural signs to be interpreted symbolically, as when a Kamtschatkan dreaming of dogs or ice would take it as foretelling a visit from Russians (Steller, Kamtschatka, p. 278). Of such interpretations, and conquests, as may be seen in such rules as that if a woman dreams of killing a fire, she will bear a male child; if one dreams of white clouds it means joy, but if black clouds trouble (Brand, vol. iii. p. 132; Tylor, i. c.). It remains to mention in few words astrology, the branch of divination whose importance
in the world has exceeded that of all the rest together. Researches into the ancient writings of Chaldaea have now shown how fully historians were justified in treating that country as the principal among the sources whence the star-gazers received their precepts (see Sayce, "Astronomy and Astrology of the Babylonians," in Trans. Soc. Bibl. Arch., vol. viii., Maury, "Le Magici et l'Astrolabe"). The rules in such comparatively modern works as Silly's "Octav Sciences" and Lally's "Astrology" fairly enough represent the ancient traditions, and show their still intelligible symbolism,—how the stars rising at a child's birth are made in the horoscope to typify its destiny, and the planets and signs of the zodiac exercise "influences" often plainly drawn from their names or names. Thus Mars has to do with soldiers, Venus with lovers, and Mercury with prattlers; the solar man is grand and generous, the lunar man unsteadfast and inclined to change his dwelling, the sign Leo presides over places where wild beasts abound, but Aries over pastures. At the courts of Asiatic rulers, the state astrologer still nominally holds a position like that of his predecessor in the ancient empires of the world, but it is evident that the last twenty years have shaken, even in the barbaric East, the power of the occult sciences over the human mind.

But in the art of diving to considerably great depth, the water to bring up pearls, corals, and sponges has been practiced in the Indian seas from very early times, and if we may believe the accounts that have come down to us, the feats of early divers are truly remarkable—some of them, it is said, having been able to prolong their submarine descents for periods varying from two to three minutes. It is obvious, however, that not having the aid of any artificial appliances for supplying air, the powers of these bold adventurers, both as regards the depth to which they could descend and the length of time they could remain submerged, were comparatively limited.

At an early period, therefore, the attention of philosophers and mechanics was turned to the discovery of a contrivance for aiding the diver in prosecuting his daring but useful calling, which was rendered all the more important from its being no longer confined to the acquisition of Eastern luxuries, but to the raising of treasure from sunken vessels. It is not considered expedient to occupy space by further reference to the feats of the early divers, but rather to pass once to the history and construction of the diving apparatus of modern times, as illustrated by the diving bell and the diving dress at present in use. And here it may be stated that in addition to the sponge and coral trade of foreign lands, which has been greatly advanced by the use of modern appliances, there are the works of the naval engineer, and more particularly of the civil engineer, in which diving apparatus is so extensively employed and so essentially necessary as to place the art of diving on a wider basis, and to give it an importance only fully developed within the present century.

The conception of the diving bell is very simple. The air contained in an inverted jar sunk in a vessel of water excludes the water from the interior, and if the vessel be made of sufficient size to contain persons within it, it may be sunk without their being wetted, and they may continue to be submerged so long as the air within the bell continues pure enough to support animation. Such were the "diving chests" of the first makers, which, though they differed in form and details, were constructed on the same principle as the modern bell, and were generally formed of wood, gilded with iron hoops, like a barrel.

It will be obvious that if such a vessel were submerged in shallow water, having a depth of say one foot of water, a large supply of air would be inclosed in the bell, and the bottom on which it rested would, from the small depth of water upon it, be easily reached for any operation to be performed on it. But if we conceive the same bell to be lowered further below the surface, the air being compressible will be reduced in volume, and the water will rise in the bell to fill its place. The result would be that at the depth of about 33 feet the air would be compressed into about one-half its original bulk, and the bell itself would be half filled with water; and the bottom of the sea on which it rested would no longer be so conveniently reached as when the water was only a few inches above the lips of the bell. Moreover, the air by repeated inspiration becomes unfit to support life, and the ancient bells had to be raised to the surface at very short intervals of time that fresh air might be supplied to the men employed. Although, therefore, the original diving bell was a step towards the perfect appliances afterwards introduced, it will readily be seen that its use in diving operations was very limited indeed.

Dr. Halley, the secretary of the Royal Society, who seems to have taken an interest in diving and divers, and being passionately their want of fresh air, communicated a paper to the Royal Society in which, to use his own words, he proposes a plan "for carrying the submersible bell down to the divers, who must without being supplied therewith return very soon to the surface or perish." The following is the description of his arrangements for this purpose. After describing the bell itself, which was of wood of the form of a truncated cone, with a capacity of 60 cubic feet, and was suspended by a sprit from the mast of a ship, he says:

"To supply air to this bell when under water, I caused a couple of barrels, of about 30 gallons each, to be cased with lead, so as to sink empty, each of them having a bung-hole in its lowest part to let in the water, as the air in them condensed on their descent, and to let it out again when they were drawn up full from below. And to a hole in the uppermost part of these barrels I fixed a leather hose, long enough to fall below the bung-hole, being kept down by a weight appended, so that the air in the upper part of the barrels could not escape, unless the lower ends of these hoes were first lifted up.

"The air-barrels being thus prepared, I fitted them with tackle proper to make them rise and fall alternately, after the manner of two buckets in a well; and in their descent they were directed by lines fastened to the under edge of the bell, which passed through rings on both sides of the leathern hose in each barrel, so that, sliding down by these lines, they came readily to the hand of a man, who stood on purpose to receive them, and to take up the ends of the hose into the bell. Through these hoses, as soon as their ends came above the surface of the water in the barrels, all the air that was included in the upper parts of them was blown with great force into the bell, whilst the water entered at the bung-holes below and filled them, and as soon as the air of one barrel had been thus received, upon a signal given that was drawn up, and at the same time the other descended, and, by an alternate succession, furnished air so quick, and in so great plenty, that I myself have been one of those who have been kept at the bottom, in nuce to ten fathoms water, for above an hour and a half at a time, without any sort of ill consequence, and I might have continued there so long as I pleased, for anything that appeared to the contrary. I only observed that it was necessary to let down gradually at first, at about 32 feet at a time; and then to stop and drive out the air that entered, by drawing 3 or 4 barrels of fresh air before I descended further. But being arrived at the depth designed, I then let out as much of the hot air that had been breathed as each barrel would replenish with cool, by means of the cock at the top of the bell aperture, though very small, the air would rush with so much violence as to make the surface of the sea boil, and to cover it with a white foam, notwithstanding the weight of the bell.

"Thus I found that I could do anything that required to be done just under us, and that I could, for a space as wide as the circuit of the bell, lay the bottom of the sea so far dry, as not to be over
shoes thereon. And, by the glass window, so much light was transmitted, that when the sea was clear, and especially when the sea was calm, I could see perfectly well to write or read, much more so than by a lantern or lay hold on anything under us that was to be taken up, and, by the return of the air-barrels, I often sent up orders, written with an iron pen on small plates of lead, directing how to move up from place to place as occasion required. At other times when the sea was troubled and thick, it would be as dark as night below; but in such cases I have been able to keep a candle burning in the bell as long as I pleased, notwithstanding the great expense of air necessary to maintain flame. Thus I take to be an invention applicable to various uses, such as fishing for pearls, diving in a ship or on a barge, and the like, in far greater depths than has hitherto been thought possible, also for the fitting and placing of the foundations of mole, bridges, &c., in rocky bottoms, and for cleaning and scrapping of ships’ bottoms when foul, in calm weather at sea. I shall only intimate that, by an additional contrivance, I have found it not impracticable for a diver to go out of an engine, to a good distance from it, the air being conveyed to him with a continued stream by small flexible pipes, which pipes may serve as a close to direct him back again when he would return to the bell.”

Such is an account of Dr Halley’s apparatus, which undoubtedly effected an important improvement, but it involved the sending down of constant relays of air vessels, and the great loss of time and interruption which attended such a means of supply. It remained for Smeaton to overcome these objections. In repairing the shoeing of the foundations of Hexham Bridge, in 1778, there being but a small depth of water, to work in, he contrived a bell to the top of which he attached a force pump in lieu of Dr Halley’s air-barrels, and as the bell, in consequence of the small depth of water, did not require to be wholly submerged, the supply of air for the divers was forced directly into the bell, being the first application of the force pump for that purpose. Subsequently to this, in 1748, having occasion to remove stones in cleaning the foundations for a pier at Rumsgate, he applied an air-pump placed in a ship or barge, and pumped air into the bell at any depth under water by means of a hose screwed into an air-hole in the top of the bell. The following is Smeaton’s description of his last improvement:

“Instead of the usual form of a bell, or of a conical tub of wood sunk by weights (externally applied), this for convenience was a square chest of cast iron, which being 50 tons was heavy enough to sink itself, and being 44 feet in height, 44 feet in length, and 3 feet wide, afforded room sufficient for two men at a time to work under it. But it was peculiar to this machine that the men therein were supplied with a constant influx of fresh air without any attention of them, that necessary article being amply supplied by a forcing air-pump in a boat upon the water’s surface.”

It will thus be seen that Smeaton’s Rumsgate bell continued all the elements of the present appliances, which, as improved in details, and constructed by Messrs. Rennie, has been so extensively employed in harbour works.

The bell as now used is shown in plan and section in figs. 1 and 2. It is a cast-iron chest weighing about 5 tons, and is suspended by block and tackle. On the top of the bell there are 8 apertures, fitted with very thick glass for admitting light, and in the centre is the passage by which the hose is screwed for admitting the supply air. The interior is fitted with two seats, which can be removed to make room when the men are at work; and in the centre is a lifting drum, to which stones are attached to facilitate their being lifted properly and adjusted to the beds on which they are to be laid. The bell is used according to two different systems, depending on the nature of the work to be performed. In building masonry under water it is suspended from a staging of timber, but in excavating rock or removing boulders, scattered over a considerable area, where a staging would be inapplicable, it is suspended from a barge or lighter.

Fig. 3 shows the arrangement as employed in laying Bellstones or blocks of concrete. It represents a cross section of the staging, bell framing, and bell carriage, in which a

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1 Smeaton’s Reports, vol. ii p 279
2 Historical Report on Rumsgate Harbour, by John Smeaton, London 1791, p. 79
motion at right angles across the work, so that the position of the bell can be altered with the greatest ease so as to bring it over any spot within the area of the staging.

In proceeding to work, the men take their seats in the bell from a boat, and the bell is then lowered to the required depth. If the work be that of building a wall a stone is lowered at the same time. The changes in the position of the bell are all made according to signs given by the divers by strokes of a hammer on the bell, which experience has shown can be heard at any depth at which the diving bell has been employed. The signals are—one stroke, more air; two, hold on; three, raise; four, lower; five, north; six, south; seven, east; eight, west. These signals are narrowly observed by a watchman stationed on a boat, and reported to the men working the bell carriage. The rule for the supply of air both to the bell and diving dress is to give it so freely that there shall be a constant escape of air rising to the surface in air-bubbles all the time the men are under water. After being lowered, the bell is first moved over the stone to be laid; the divers then unhook the lowering chain from the lewis in the stone, and at the same time make fast the stone to the tackle within the bell, which is at once signalled to be raised, and carries the stone with it. The bell is then moved over the site on which it is to be placed; it is then lowered until it has nearly reached its bed, on which it is finally deposited. The lewis is then removed and the bell raised for another stone; and with trained workmen it is surprising how expeditiously the bell is moved from place to place, and stone after stone is built in the walls. The staff of men required to work the bell is two divers, one watchman, four men working the air-pump, and four working the bell carriage, besides the men required to bring forward and send down the stones. The men engaged generally work in shifts of from 3 to 6 hours according to the depth, and the diving work may be continued as long as in ordinary day-work, as in clear water the light is good to the greatest depth at which the bell is used in harbour building.

When engaged in blasting, the bore is made in the ordinary way, and charged with a shot inclosed in a water-tight canvas case, to which is attached a length of 6 or 8 feet of patent fuse. The bell is then moved from above the bore, and the fuse ignited, and when the shot is fired the smoke rises to the surface clear of the bell.

When employed for removing rock or boulder stones—for example, in a river navigation,—it is of advantage that the bell be capable of being easily transported, and in that case it is swung from a barge or lighter, which contains the machinery for working the bell and air-pumps, and a crane for raising the boulders as the divers sling them. It is of course attended with greater trouble and risk to the divers to work the bell from a lighter than from a stage; but, on the other hand, the convenience in being enabled to tram-it from place to place, in a river navigation, is a great advantage.

Figs. 4 and 5 show the disposition of the various appliances in the most recent bell-lighter built by Messrs
Simons of Renfrew for the River Clyde, which was communicated by Mr. Dess, the engineer, to the Clyde Trustees. Fig. 4 is a longitudinal section in and fig. 5 a plan in which a is the bell, b the bell crab, c the air-pumps, and d the crane for lifting stones, &c., slung by the divers. The large cost of a diving bell limits its use to works of magnitude, especially as many submarine works can be done better by the diving dress, which is much less expensive; but there are certain operations, such as the clearing and levelling of foundations, for which the bell is peculiarly well adapted, that still enable it to take its place as one of the most useful appliances of the marine engineer. Mr. B. B. Stoney has, in an interesting paper in the Minutes of Proceedings of the Institution of Civil Engineers, described a diving bell, or chamber, 20 feet square, with which he successfully built the foundation of the quays of Dublin. Mr. Stoney's apparatus does not come under the article diving, but belongs more properly to the subject of the compressed air cylinders used in the buoys building, which are described under the article Buoys.

Diving Dress.—The diving dress is peculiarly well fitted for such works as the repair or overhaul of rollers and sluices of lock-gates, cleaning or repairing sluices' bottoms, descending into the hatches of wrecks to recover property, and, in short, everything that cannot be done from the interior of a bell. The insufficiency also of the diving dress, dispensing with all costly staging, and its ease of transport and appliance, are much in favour of its use. It is, indeed, so convenient in the repair of propellers, examining sluices' bottoms, retrieving anchors, &c., that all ships in Her Majesty's navy of sufficient size to be commanded by captains are now supplied with a diving dress or apparatus, and bear a certain number of divers in their complements, and all sea-going flagships and iron-clads on foreign stations carry two sets of diving apparatus, and are allowed a suitable number of trained divers.

The invention of the diving dress, like that of most useful appliances, was gradual, and the work of many minds. Some early proposals, such as that already referred to in the quotation from Mr. Hailey's paper in 1721, and others of more modern date, were made for providing the diver with a dress to enable him with safety to carry on his work, for an account of which the reader is referred to a paper by Mr. J. W. Heinke in the Minutes of Proceedings of the Institution of Civil Engineers. But to Mr. A. Siebe is due the credit of being the first to introduce a dress, which was supplied with a constant stream of fresh air, and may be said to have been the precursor of the dress now in use. We allude to what was called the "open dress" invented in 1829, which consisted of a helmet and waterproof jacket, under which, and fitting more closely to the body, were worn trousers reaching to the arm-pits, and between the jacket and trousers the air pumped in at the helmet was allowed to force its way and escape to the surface as in the diving bell, and hence it was called "open." Although some divers of the old school are said still to give a preference to the open dress, its danger became manifest; for if a diver stumbles and fell on his face or side, the water entered his dress, and unless quickly brought to the surface he was in danger of being drowned—a necessary requirement of the open dress being that he should remain in an upright or gently sloping position. To meet this defect, Mr. Siebe, in 1837, introduced the "close" dress, which is now almost universally used. Various minor improvements were introduced between 1839 and 1843 connected with the removal of the wreck of the "Royal George" ship of war, conducted by the late Sir Charles Pasley, which will be found fully described in the Minutes of Proceedings of the Institution of Civil Engineers. The long continued experience gained in diving while these operations were in progress suggested improvements and alterations which had a great effect in bringing the diving dress to its present perfection as now manufactured by Siebe, Heinke, Barnett, and other makers.

The diving dress, as will be understood from fig. 6, envelops the whole body of the diver, the upper portion a being the "helmet," the intermediate portion b the "breast-plate," and the lower portion c the "dress." The hose by which the air is supplied shown at d, and e is the "life" or "signal" line, which is attached to the diver's waist, and by which he makes signals and is hauled to the surface. The water-proof material of which the dress is made is very generally sheet india-rubber covered on both sides with tanned twill to protect the india-rubber from injury. The cuffs fit tightly round the wrists, leaving the hands free, and india-rubber bands slipped over them render the joint water-tight. The breast-plate b is made of turned copper with an outer edge of brass, which has screws fitted to it projecting upwards and passing through corresponding holes in the collar of the dress. On the top of this, and with holes in it corresponding to the screws, four pieces of a metal band are firmly screwed down by wing nuts, nipping the soft material of the collar between the metal of the breast-plate and band, and thus ensuring a water-tight joint. On the front of the breast-plate two studs are fastened for securing the back and front weights f. Some makers put a valve &c., on the front of the breast-plate, by means of which the diver can regulate the pressure inside his dress, but in this way has the power, by simply inflating his dress more or less, of making himself of any specific gravity, so as to float at any desired depth or rise to the surface without the assistance of the attendant. This arrangement in the hands of a skilled diver is undoubtedly a great convenience. But it is still a matter of difference of opinion whether it is not safer to trust to being hauled up by the watchman on the surface, whose duty it is to hold the life or signal line in one hand, and the air hose in the other, while the diver is at work, and to attend to whatever signals he may give by pulling the life line. The inconvenience of the air bubbling up in front of the bulls' eyes, and the danger of inexperienced divers becoming giddy and turning the valve the wrong way, have induced some makers to do away with this useless ful valve, and to substitute at the back of the helmet a valve which the diver can regulate by the pressure of his hand, but which rights itself the moment his hand is removed. The neck of the breast-plate is fitted with a "segmental screw bayonet joint" (introduced by Messrs. Siebe), and to this the helmet, the neck of which is fitted

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Diving

with a corresponding screw, can be attached or removed by one eighth of a turn. The helmet, a side view of which is given in fig 7, is made of tinned copper, and fitted in front with three strong plate-glass windows, or bulls' eyes, in brass frames protected with guards. Messrs Henke introduced sliding covers to draw over these windows in case of their getting broken. The front eye piece is made so that it can be unscrewed, and in this way the diver on ascending can rest himself for a short time without removing the rest of his dress. Messrs Barnett have introduced instead of this a hinged glass frame, which fits tightly into a conical vulcanized indiarubber seat like the ordinary port hole of a ship, so that it can be opened by the diver himself the moment his head is above water, and being attached to the helmet it cannot be dropped accidentally into the sea or otherwise mislaid. An outlet valve is fixed at the back of the helmet, which, opening outwards, permits the escape of the foul air but prevents the entrance of water. The inlet valve by which the hose is attached is also fixed at the back of the helmet, and is so constructed as freely to admit the air from the force pump; but should anything occur to prevent the valve from doing its duty, any air that may enter should pass through a sufficient supply of air in the dress to support the diver till he can be hauled to the surface. The air after entering by the inlet valve is conducted in tubes to the front of the helmet, so that the diver has the advantage of inhaling fresh air, and the front glasses are kept free from the condensation of his breath which would otherwise take place. On each side of the helmet is a hook over which the cord passing which carry the front and back weights, and a brass stud to one of which the life line, and to the other the air tube, are attached; d d is the joint by which the helmet is screwed upon the breast-plate. The back and front weights weigh about 40 lb each, and are held close to the diver's body by means of a lashing passing under his arm-plates. The boots are made of stout leather, with leaden soles, secured by two buckles and straps, each boot weighing about 20 lb.

The cost of a diving dress, with all its appliances, is about £140.

The sponge, pearl, and coral fisheries, originally carried on by free divers, as already noticed, are now conducted to a great extent by the help of artificial aids; and, according to Mr Siebe, upward of 300 sets of diving dressses are employed in the Mediterranean sponge fisheries alone, and they are being introduced in the Bahamas, Bermuda, Ceylon, the West Indian Islands, and on the coast of Australia.

As already stated, at moderate depths not exceeding 30 to 40 feet, and with clear water, sufficient light is transmitted to enable the diver to perform any ordinary work, and in working in turbid water with the diving bell candles are employed. Mr Siebe has also constructed an electric lamp and an oil lamp which can be employed where light requires to be used by divers at great depths.

Captain Eads states that at the Mississippi bridge candles were at first employed, which, under a pressure of 100 feet, were found to be burnt down in about three-fifths of the time required in the open air; under a pressure of 80 feet it was found that a candle if blown out by the breath would immediately reignite; and at the depth of 108 feet a candle was blown out thirteen consecutive times in the course of half a minute, and each time excepting the last was reinitiated.

The depth at which diving can be safely conducted is a question of importance. The ordinary depth at which the diving bell has been employed in harbour works is from 30 to 35 feet; and it has been used in 60 feet at Dover.

With the diving dress much greater depths have been attained. Mr Siebe relates that in removing the cargo of the ship "Cape Horn," wrecked off the coast of South America, a diver named Hooper made 7 descents to a depth of 201 feet, and at one time remained 42 minutes, supposed to be the greatest diving feat ever achieved. Mr Frendenburg states that in the repair of a pump in the Scharley zinc mines in Silesia, two divers went down the pump well to a depth of 85 feet, remaining from periods varying from 15 minutes to two hours. In the knowledge of the author the greatest depth at which the diving dress was used in the open sea was in the Firth of Forth. A Royal Commission on the Operation of the Acts relating to the Trawling for Herring on the Coast of Scotland resolved to obtain the herring spawn from various portions of the exposed parts of the firth, and this duty was successfully accomplished in depths of from 14 to 16 fathoms, from the deck of the "Princess Royal." The writer is indebted to Mr J. Messent, the engineer of the Tyne piers, for the following notes of his experience at that work. "On the Tyne Pier works helmet and bell divers are employed simultaneously—the former for excavating and fixing the feet of the piles of which the staging is composed, the bell divers for levelling the foundations and fixing the blocks of which the pier is composed. The helmet diver has greatest power in lifting. He can exert but a few pounds of force in pulling downwards (unless he can fasten himself down) on account of his buoyancy, and for the same reason he cannot pull or push horizontally with much force unless he has a fulcrum or stop for his feet or body. Thus, in boring an auger hole in a pile he would have to lash himself to it, unless there was a projecting rock or stone that he could get his foot against. In the use of a hammer and other tools for striking he is restricted by the water;" but Mr Messent has known good men do fair work with a hammer and chisel. It is difficult for them to walk against even a moderate tide, and men who by accident get on the (lee) tide side of their work, generally have to be hauled up to their boat and lowered down again in order to get on the (windward) tide-way side of it; again, experience enables many of these difficulties to be met or modified, but it is advantageous to bear them in mind in arranging work for divers. Most of the divers at the Tyne have been made or instructed on the works, and of the men who have tried helmet diving not more than one out of three or four succeed or become divers, the failure being sometimes from physical causes, but more often from want of head. There is less difficulty in making bell-divers, probably on account of their working in company, than being always two men in a bell, and the same amount of self-reliance is not needed.

1 Reports by Captain James R. Eads to the President and Directors of the Illinois and St Louis Bridge Company.

The practice of diving obliges the diver to conduct his work under a pressure greater than that of the atmosphere at the surface of the earth. All diving work is done under an abnormal atmospheric pressure, which increases with the depth at which the diver is submerged in water. This pressure, when he is submerged to the depth of 33 feet, is twice that of the normal superficial atmospheric pressure. At greater depths the pressure is proportionately increased, and so great that life could not be maintained. To descend even to the moderate depth of 30 or 40 feet, which is about the maximum required for ordinary engineering sea works, demands some practice and nerve on the part of the diver, but when greater depths have to be explored, in passing sunk vessels, for example, the energy and power of endurance of the diver are much more severely taxed, and it seems not uninteresting, before concluding this article, to refer to the effect which the work has on the health of the diver, as well as on some physiological facts of interest in general science.

The sensations experienced in a diving bell are common, it is believed, to all divers. According to the writer's experience, very soon after the lips of the bell have touched the surface of the water pain is felt in the ears and above the eyes, which continues with greater or less intensity according to the rate of descent until the bell has attained the bottom. So long as the bell continues there no pain is felt, the only feeling being that of depression due to the depth to which the diver is submerged. As soon as the upward movement commences the pain in the ears and above the eyes returns, and continues till the surface is reached. The motion of the bell is very gradual, sometimes not exceeding 3 feet per minute, but even at that slow rate the head does not accommodate itself to the increase of pressure so as to avoid inconvenience. Aeronauts do not suffer to the same extent in their ascents in balloons, because the alteration of pressure is much more gradual in passing through the atmosphere than through a medium having the density of water.

Several suggestions have been offered as accounting for the sensations which are experienced in diving, and the following explanation, which the author has submitted to Professor Turner of Edinburgh, is believed to afford the true solution. Under the ordinary atmospheric conditions, the air presses not only on the surface of the body, but into every cavity within the body which communicates with the surface, so that the pressure, both externally and internally, is exactly balanced. In passing into a denser atmosphere the increased pressure operates externally more rapidly than it does internally, more especially if the communication of the internal cavities with the surface is by tortuous passages, and so long as this inequality in the pressure exists the disagreeable sensations in the ears and above the eyes will continue. The pain in the ears arises from the effect of the condensed air acting externally on the tympanic membrane of the ear, before the air within the tympanic cavity has acquired the same density to counter-balance it. The tympanic membrane stretches across the bottom of the passage of meatus, which leads from the outer ear into the side of the head (see Anatomy, fig 80).

This passage is in direct communication with the atmosphere, the pressure of which, therefore, acts instantaneously on the tympanic membrane. But on its inside the tympanic membrane bounds the tympanic cavity, which has the surface of the earth. An external air, excepting by the Eustachian tube, which leads from the cavity into the pharynx immediately behind the nose. Through this tube, therefore, the condensed air must pass from the pharynx to supply what is necessary within the cavity for restoring the same equilibrium within and without. But the Eustachian tube is a long and narrow passage; at its commencement in the ear it has a bony structure, but towards its termination in the pharynx behind the nostril, it becomes soft, so that its walls can be forced together. It admits an easy passage from the ear to the pharynx; but when any pressure arises in the opposite direction, it acts in some degree like a valve, shutting the passage, until the increasing pressure again forces it open. Some time then elapses before all this can be accomplished, and during this time the external air, pressing with full force on the tympanic membrane, produces the pain which is felt. When the Eustachian tube opens, it is generally all of a sudden, and with a slight expansion or pop, which is followed by instant relief from the pain. This relief may often be produced by filling the mouth, or gulping the air and passing it into the tube.

That the above is what really takes place may be shown experimentally by shutting the mouth and nostrils, and exhausting the air from them by the action of the lungs. The air in the tympanic cavity immediately rushes through the Eustachian tube into the mouth, the external air on the tympanic membrane produces a slight sensation of deafness, such as is felt in the bell. But if, instead of exhausting the air, we attempt to compress it, and force it through the tube into the tympanic cavity, at first no effect is produced; but after exerting a considerable pressure a slight pop is felt, and a little pain in the ear, which is just the sudden opening of the tube.

The pain above the eyes is doubtless due to the inequality between the pressure of the air on the surface of the forehead and that of the air in the frontal sinuses, or air spaces in the frontal and other bones which form the boundaries of the orbits. The return of the disagreeable sensations during the upward ascent of the bell is due to the pressure on the outer surface of the tympanic membrane and of the forehead being diminished, before the air within the tympanic cavity and the air spaces in the bones of the orbits has accommodated itself to the diminished external pressure.

It may further be interesting to notice that any upward motion is accompanied by a thick must within the bell, which disappears when it is stationary or moving downwards. The explanation is that the air inside the bell, when it is ascending, being relieved of pressure, expands, and its temperature is lowered, and as the air inside is about the point of saturation, the fall of temperature produces condensation, which becomes visible in the form of vapour or mist. An analogy may be seen in the case of someone in a warm room commencing to exhaust the receiver of an air-pump.

The question of the effect produced on the health of the men employed in diving is of interest and importance, so far as the author's experience goes, he is not aware that divers suffer from prosecuting their submarine work under the pressure of one or two atmospheres to which they are subjected in ordinary harbour works, the men selected for such duty being generally healthy young men of athletic make. Indeed, it is well known that to some constitutions, and in some forms of disease, subjection to moderate increase of atmospheric pressure proves beneficial. But when greater depths and high pressures have to be sustained the case may be very different.

Mr Siebe, who states the greatest depth to which a diver has descended to be 201 feet, with a pressure of 65 lb. on the square inch (but who states 150 feet as the limit for safe work), has given various directions, the result of his experience, as to the selection of men for deep diving, and advises that men should not be employed who are of full habit of body, who suffer from headache or deafness, who have at any time had spitting of blood or palpitation of the heart, who are pale and whose circulation is languid,
or who are of intemperate habits. He also says that the rate of descent and ascent must depend very much on the constitution and experience of the diver, about 2 feet for a strong man for depths not exceeding 80 feet, and for descending to greater depths additional care must be used. The greatest pressures to which men are subjected in engineering works are experienced in the compressed air cylinders used in bridge building (see article BRIDGE). At Saltash bridge it was found that the men could not work long shifts at the depth of 86 feet without serious inconveniences of some of them, after working seven hours, being slightly paralyzed, but in two or three days they quite recovered. With three hours' shifts the men could work for several months consecutively.

At Londonderry bridge, where the men wrought under a pressure of 75 feet, or about two atmospheres, Sir John Hawkshaw found that there was considerable difference in the relative ability of men to stand the pressure. He had found that the working under pressure was 352, of whom 95 could not recover; 65 were affected by the compressed air, 24 were paralyzed for a few days, 10 became insane, and 100 died of heart disease. The total number of men employed in working under pressure was 352, of whom 95 could not recover; 65 were affected by the compressed air, 24 were paralyzed for a few days, 10 became insane, and 100 died of heart disease.

Captain Eads, the engineer of the St Louis bridge, built across the Mississippi in 1870, gives some interesting information, in his report to the directors of the Illinois and St Louis Bridge Company, on the effect of working under high pressure on the men. The maximum depth to which the cylinders had to be sunk was 110 feet below the water level, and the greatest pressure under which the men worked was 50 or 51 feet on the square inch. When the depth of 60 feet had been reached some of the men were affected by paralysis of the lower limbs, which usually passed off in a day or two. At greater depths the symptoms were more severe. The duration of working in the air chamber was gradually shortened from four hours to one hour. The total number of men employed in working under pressure was 352, of whom 30 were seriously affected and 12 cases proved fatal.

DIVORCE is the dissolution of the relationship of marriage. Few social questions are surrounded with greater difficulty than this. For what causes divorce should be granted, and whether complete divorce should be granted at all? The sense of authorizing the spouses to contract new marriages, are points on which civilized societies have arrived at very different conclusions. Modern practice and opinion are to be traced mainly to two sources of principle, viz., Roman law and the Christian religion. The effect of the spread of Christianity was to reinvest marriage with the religious character from which in the later law of Rome it had completely escaped; and the history of divorce in modern times has been the gradual decay of the restrictions which were thought appropriate to the religious character of the institution of marriage. At the same time these restrictions have nowhere disappeared. The opinion of society visibly fluctuates between the belief that marriage is less able to stand the pressure. He had found that the working under pressure was 352, of whom 95 could not recover; 65 were affected by the compressed air, 24 were paralyzed for a few days, 10 became insane, and 100 died of heart disease. The total number of men employed in working under pressure was 352, of whom 95 could not recover; 65 were affected by the compressed air, 24 were paralyzed for a few days, 10 became insane, and 100 died of heart disease.

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These experiments in divorce legislation display anxiety to regulate the relationship of marriage as a purely civil institution, with a view mainly to public decorum and the comfort of individuals. When marriage had manifestly failed it was no longer worth preserving, and it was readily undone when either of the parties showed a desire to withdraw from the alliance. At the same time an innocent party must be protected against the caprices of an unquiet spouse, and such protection was sought by the device just described. It is a remarkable illustration of the Roman view of marriage that, in view of what must have been the great social evil of capricious divorce, the right of either party to dissolve the marriage was never successfully questioned. From the early Roman to the Canon law the change is great indeed. The ceremony becomes sacred, the tie indissoluble. Those whom God hath joined let not man put asunder, was the first text of the new law of marriage, and against such a prohibition social convenience and experience pleaded in vain. While marriage once created became indissoluble, the impediments to marriage also multiplied. The canon law annulled a marriage ab usato for causes which we should now consider wholly inadequate. The tie of consanguinity was extended to the eighth generation; and affinity, it was held, might be established by adulterous intercourse without marriage. The power of dispensing with canonical disabilities, and the power of annulling marriage on the ground of such disabilities, belonged to the church, and were important aids to its influence in society. In countries which have embraced the doctrines of the Reformation, a relaxation of the law of divorce has generally followed the changes of religion—whether immediately, as in Scotland, or indirectly, as in England. In Roman Catholic countries the theory of the canon law still rules.

The history of divorce in English law is particularly interesting. Down to the passing of the Divorce Act of 1857, the theory of the law of England was the same as the theory of the Roman Church. There were attempts during the period of the Reformation to introduce a greater licence of divorce, and in the Reformatio Lexum Ecclesiasticorum (a code of ecclesiastical law projected by a royal commission, but never enacted) the leaders of the Reformation sanctioned principles which would even now be considered liberal. Divorce was to be granted for adultery, and the innocent spouse was to be permitted to marry again. Other grounds for divorces were specified, such as desertion and continued absence, and savageries of temper. Separation a mens et thro. was to be superseded by annulment. And the more advanced Reformers advocated even greater liberty of divorce. The nature of their proposals, and the arguments by which they reconciled them with the language of Scripture, may be studied in Milton's tracts on the Doctrine and Discipline of Divorce, addressed to the Parliament of England. But the law remained unchanged. The constitution of marriages belonged to the jurisdiction of the ecclesiastical courts. The tie was indissoluble. The marriage, indeed, might be declared null and void in certain cases, e.g., where the parties were within the prohibited degrees of consanguinity or affinity. This proceeding was not a dissolution of marriage so much as a declaration that no real marriage had taken place between the parties. Divorce a mens et thro. was granted for adultery and cruelty. Here the marriage, being originally good, was not dissolved, but a separation was ordered either for a limited or an indefinite time. The spouses were not permitted to marry again. But while the law remained unchanged, the practice of granting complete divorces by private acts of Parliament had come into existence. The legislature did in particular cases what it refused to do by a general law. Two conditions were in general necessary to satisfy Parliament: 1st, A divorce a mens et thro. had to be obtained from the ecclesiastical court. 2d, An act for damages had to be brought against the adulterer in the civil court for criminal conversation. The latter was not absolutely necessary, and appears to have been regarded as a safeguard against divorces being granted to persons who had cohabited at the acts of adultery, or had themselves been guilty of misconduct in the marriage state. The passing of these Acts through Parliament became a matter of as much formality as a proceeding in an ordinary law court. The two Houses passed standing orders on the subject, under which bills on divorce were argued before the law lords by professional advocates, and generally neither the House of Commons nor the law lords interfered. By this characteristic evasion, the law of England completely changed its practice while still maintaining its ancient theory of divorce. Probably the anomalous character of the remedy might not have brought about a change but for the great practical evil of the expense attending the proceedings. Three suits—ecclesiastical, civil, and parliamentary—were necessary. Divorce became a remedy for the rich. The poor were driven to bigamy. 1 Yet it was not until 1857—and not then without determined resistance—that this disgraceful state of things was changed. A commission appointed in 1850 recommended the establishment of a regular court for divorce, and that divorce should be granted for the wife's adultery but not for the husband's unless aggravated by other offences. Bills constructed on these principles were introduced into Parliament, and successively abandoned or lost, until in 1857 the ministry of the day by great exertions carried the bill which is now the Act of 1857. The new court, to be called the Court of Divorce, was to be established by statute, and its proceedings and proceedings in the Divorce Court are now, with few exceptions, the same object and result as the former proceedings in Parliament and in the civil and ecclesiastical courts. The action for damages for bigamy, con, is represented by the adulterer being made a party to the husband's suit. Full divorce is granted on the principles usually recognized by the House of Lords; and the other remedies are such as might formerly have been granted by the ecclesiastical courts. The following statement embraces the most important provisions of the Act—

All jurisdiction in matters matrimonial (e.g., in respect of divorce a mens et thro., suits of nullity of marriage, of separation, of restitution of conjugal rights, &c.) shall cease to be exercised by the ecclesiastical courts, and shall in future be exercised by a new court, to be called the "Court for Divorce and Matrimonial Causes." The Lord Chancellor and other judges are named as members of the court; and the judges of the new constituted Court of Probate, who is to be the judge ordinary of the new court. Divorce a mens et thro. is under that name abolished, but a new remedy called judicial separation is introduced, which shall have the same effect, and such other legal effect as in the Act mentioned. This remedy may be obtained by either husband or wife, on the ground of adultery or cruelty, or desertion without cause for two years and upwards. At the same time it is provided that a wife deserted by her husband may apply to a police magistrate or justice of the peace for a protection order, by which her earnings and property acquired since the marriage shall be protected from sale. The case of a wife deserted by her husband is somewhat different. The income of a wife deserted by her husband is not liable to attachment elsewhere, and the wife may claim not only the same amount, but also the amount of the husband's separate property. In the case of a wife deserted by her husband the income of the husband shall be attached for her benefit. The income of a wife deserted by her husband shall be attached for her benefit. The income of a wife deserted by her husband shall be attached for her benefit. The income of a wife deserted by her husband shall be attached for her benefit.

1 The naturalistic description of Mr Justice Maule to a poor man convicted of bigamy, in 1845, put the abominations of the existing law in a light not likely to be forgotten. The prisoner's wife had robbed him and run away with another man. "You should have brought an action," he told him, "and obtained damages, which the other would not have been able to pay, and you would have had to pay your own costs, perhaps a hundred or a hundred and fifty pounds. You should have gone to the ecclesiastical courts, and obtained a divorce a mens et thro., and then to the House of Lords, where, having proved that these preliminaries had been complied with, you would have been enabled to marry again. The expense might amount to five or six hundred or perhaps a thousand pounds. You say you are a poor man. But I must tell you that there is not one law for the rich and another for the poor."
commencement of the desertion may be protected from her husband and his creditors, and belong to herself as if she were an unmarried woman. In all cases except dissolution of marriage, the divorce court shall act as "principles and rules according to the opinion of the said court shall be as nearly as may be conformable to the principles and rules on which the ecclesiastical courts have heretofore acted," subject to what is said of the rules of order under the Act. Where a decree of separation has been obtained, in the absence of the husband or wife, as the case may be, it may be reversed on proper cause shown. In any case in which it shall be alleged, by general and open avowal, the wife should, so far as her husband, any property she may be entitled to shall be held to her separate use, subject to any agreement she may have made with her husband. The judges, however, in a case of a separated wife should be treated as an unmarried woman for purposes of contract and in civil proceedings generally. The most important point which has been made of all, so far as the judges, in general, are concerned is the question of divorce. A divorce is a judicial separation of the parties.

The Act of 1866 contains the following important clause (§ 7). "Every decree for a divorce shall not only be a decree nisi, but not to be made absolute till after the expiration of such time, not less than six months from the pronouncing thereof, as the case may be. The decree nisi shall be filed in the office of the judge who held the first hearing, and during that period any person shall be at liberty to show cause why the said decree should not be made absolute, by reason of the same having been obtained by collusion, or by reason of material facts not having been brought before the court; and on cause being shown, the court shall deal with the case by making the decree absolute, or by reversing the decree nisi, or by requiring further inquiry or otherwise as justice may require, and at any time during the progress of the cause, or before the decree is made absolute, any person may give information to the court as to the character of any matter material to the due decision of the case, who may thereupon take such steps as the attorney-general may deem necessary or expedient; and if from any such information or otherwise the said proctor shall suspect that any parties to the suit, or have, been, acting in collusion for the purpose of obtaining a divorce contrary to the provisions of the Act, he may upon a direction of the attorney-general, and by leave of the court, intervene in the suit, alleging such case of collusion, and retain counsel and subpoena witnesses to prove it." Thus clause is a most important addition to the securities against collusion suits provided by the earlier Acts. The time limit of six months has been extended to six by the Act of 1886. These sections have been extended by the Act of 1873 to cases of nullity of marriage. The other provisions of the various amending Acts do not call for notices here.

One or two points in the above summary may be further explained. The greater favour shown to husbands' petitions for divorces than to wives' follows with tolerable closeness the principle on which the House of Lords acted in passing private bills. The reason why the adultery of the husband is considered a less serious offence than the adultery of the wife will be obvious to every one. As a matter of fact, wives' bills for divorce before Parliament were comparatively few, and some circumstance of aggravation was required. The first divorce granted to a wife by Parliament was in Addison's case in 1891, and the decision was mainly brought about by the masterly speech of Lord Thurlow. It may be added that Parliamentary bills for divorces were not common until the 19th century. After the accession of the house of Hanover they became frequent.

The right to a divorce or separation on any of the grounds mentioned may be avoided by conduct on the part of the petitioner amounting to what is called condonation, or forgiveness, e.g., if after the offence complained of the parties resume cohabitation. But the offence condoned may be revived, that is, the original right to sue thereon may be restored by a repetition of the offence. Thus a new act of adultery will revive a condoned adultery. So with an act of cruelty. It was also held in the ecclesiastical courts, and appears to be the law, that cruelty would revive adultery, and vice versa. The question then arose whether an act of cruelty could revive an old condoned act of adultery, or vice versa, so that the two might be pleaded together by the wife in support of her petition for dissolution of marriage. The remedy may also be barred by the conscientiousness of the petitioner, i.e., his consent, express or implied, to the adultery of the spouse; and also by collusion, i.e., a conspiracy between the parties, or between one of them and a third party, to obtain a sentence of divorce or separation. The last-named being the same end is not of itself collusive. But where they combine to bring about the offence, or to produce evidence from which the offence may be inferred, or to deceive the court by the suppression of material facts or otherwise, they are guilty of collusion. Recrimination for the old ecclesiastical law was when the respondent repurts by imputing to the petitioners conduct similar to
That complaint of. He must come into court with clean hands, and if he has himself been guilty of adultery he cannot obtain a sentence against his wife for adultery. Incrimination ought not to be of such a nature as the one complained of; the petitioner is said to cause had to be omitted. But under the 31st section of the new Act above referred to, adultery, cruelty, unreasonable delay, desertion, and misconduct conducing to adultery are made discretionary bars to divorce—that is, if they are proved, the court is not bound to pronounce the sentence of dissolution which would otherwise follow on proof of the respondent's adultery. In a recent case, where the respondent had previously obtained a decree of judicial separation on the ground of desertion, the husband's petition for dissolution of marriage on the ground of the wife's adultery was rejected by the court.

The matrimonial suits inherited by the Divorce Court from the old ecclesiastical courts are those for nullity of marriage, for restitution of conjugal rights, and for jactitation of marriage. These suits must be decided according to the principles of the canon law as administered in the English ecclesiastical courts. A marriage will be declared null ab initio when the requisites of a legal marriage have not been complied with. The alleged defect must have existed at the time of the celebration of the marriage. The formal requisites are (1) that the marriage should be celebrated in the presence of a priest, in a regular church, or in the presence of a public officer, or in a building registered for the solemnisation of marriages, except when solemnized by a priest in a private house or by a priest in a private house. These rules only apply to marriages in England, and a marriage is void only when the requisites are deficient, and known to both parties to be deficient, at the time of the ceremony. The two other requisites apply to all marriages, and if they are wanting the marriage is absolutely void.—(2). The marriage must be between a man and a woman, not being within the prohibited degrees of consanguinity and affinity, and who are of the same sex and of a sound mind, and able to perform the duties of matrimony. The "prohibited degrees" are those set forth in the common prayer book, and extend to legitimate as well as legitimate relations. The ecclesiastical courts had been in the habit of annulling such marriages previous to the 5 and 6 Will IV, c. 54, and until so annulled, in the lifetime of the parties, they were regarded as voidable only, and not void. That enactment, however, while ordering that marriages already celebrated "between persons within the prohibited degrees of affinity" shall not be annulled for that cause only by the ecclesiastical courts, goes on to declare that all marriages which shall thereafter be celebrated between persons within the prohibited degrees of consanguinity and affinity shall be absolutely null and void to all intents and purposes whatever. As to the second requisite, fraud, force, or duress, showing the absence of consent, will make void the marriage. Insanity at the time of the marriage has the same effect. A marriage may also be annulled for bodily incapacity existing at the time of the marriage, and proved to be incurable. In a petition for restitution of conjugal rights, the marriage must be proved, and it must be shown that the respondent has withdrawn without reasonable cause from cohabitation with the other spouse. The court can only order husband and wife to live under the same roof. The petitioner will be refused a divorce, even for restitution if he has himself committed any matrimonial offence which would be ground for judicial separation.

Jactitation of marriage is when "one party boasts or gives out that he is married to the other, whereby a common reputation of their marriage may ensue." Suits for jactitation are not now common. The only remedy of the court is to decree perpetual silence against the jactitator.

Statute Law.—Divorce for adultery has been recognized in Scotland since the Reformation, and is now regulated by any statute, but to have been assumed by the post-Reformation judges as the common law. In another point the law of Scotland is in advance of the law of England. Divorce for adultery is competent to either spouse. Malicious desertion is also a ground for divorce. This was enacted by a statute of 1573, c. 55. A previous act of 1554, c. 6, made jactitation unprovable. The common law of adultery was formerly necessary, but is now abolished by the Congregational and Mutual Acts 1851-53. Reconciliation is no bar to an action for divorce in Scotland, and any ground which would satisfy a decree of judicial separation would have, in a difference of old age, or old action for adherence. Judicial separation is granted for cruelty and adultery, the party injured by the adultery of the other spouse may choose either judicial separation or divorce. The cruelty required to justify judicial separation must, as in England, be of such a nature as to render the marriage a mere solitude, and who are those for this act?—(1), the clause of the bound nullity of marriage. Insanity is also a ground for divorce. This was enacted by a statute of 1850, c. 7, and applies to all marriages, and extends to civil and private marriages. Adultery, cruelty, and desertion are the grounds on which this act applies. The alleged defect must be proved. The court must be satisfied that the marriage is absolutely null and void to all intents and purposes whatever. As to the second requisite, fraud, force, or duress, showing the absence of consent, will make void the marriage. Insanity at the time of the marriage has the same effect. A marriage may also be annulled for bodily incapacity existing at the time of the marriage, and proved to be incurable. In a petition for restitution of conjugal rights, the marriage must be proved, and it must be shown that the respondent has withdrawn without reasonable cause from cohabitation with the other spouse. The court can only order husband and wife to live under the same roof. The petitioner will be refused a divorce, even for restitution if he has himself committed any matrimonial offence which would be ground for judicial separation.

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The law of divorce being thus different in different countries, while people are constantly moving from one country to another, there arises the juridical difficulty of the conflict of laws. A man born in one country, married in a second, and domiciled in a third, may there sue for a divorce on account of a matrimonial offence committed in a fourth. How is such a case to be decided, and what will be the effect of the decision in other countries than that in which it was pronounced? It is in the jurisprudence of England and Scotland, as Story points out, that such questions have been most satisfactorily discussed. On the Continent the prevalence of the canon law, and the indifference of domestic tribunals to the opinion of foreign countries, have made these questions of less importance than they have been with us. England and Scotland stand to each other in the relation of foreign countries, while socially and politically they are one country. On the fundamental question whether marriage can be dissolved or not they took, until the passing of the English Divorce Act, different sides. When an English marriage was brought before the Scotch courts on a matrimonial complaint, they dissolved the marriage, while the English courts after such a dissolution held that the marriage still subsisted in full force and effect. The House of Lords, which was at once the highest court of appeal in Scotish and in English law, may almost be said to have decided the same question in two different ways,—holding that by the Scotch law the dissolution was good for both, and not denying that by the English law it was bad for England. The two cases on which this opposition of views was most distinctly brought out were Lolley's case (1 Russell and Ryan) and Warrender v. Warrender (2 Clark and Finnelly). In the former case a man was convicted for bigamy, and who married in England, resided two years and that the Scotch marriage was still valid and subsisting. Conviction for crime as a basis of divorce; the law of Scotland, it appears that the House of Lords in a Scotch case was bound to administer the law of Scotland, and that by the law of Scotland the marriage was dissolved. The judgment in Lolley's case was not overruled; and although English marriages are not indissoluble, it may be presumed that the principle of that case would be applied when an English marriage had been dissolved in a foreign country for an offence not recognized as a valid ground of divorce in England. The following more recent cases may be noted as illustrating the attitude of English law towards foreign divorces. When the marriage took place in England, but the parties never lived together, and the husband committed adultery, and afterwards by arrangement went to Scotland for the purpose of founding a jurisdiction against himself, and the Scotch court pronounced a decree of divorce,—it was held that a Scotch marriage duly celebrated between the divorced wife and an Englishman did not give to the children of the marriage the character of lawfully begotten so as to enable them to succeed to property in England. So when A, an Englishwoman, married B in Scotland, and was again married to him in Belgium, and afterwards a Belgian court pronounced a decree of divorce by mutual consent, it was held that A's subsequent marriage to C in England was null and void, and that the Scotch marriage was still valid and subsisting. Again, a petitioner whose original domicile was English, and who married in England, resided two years in one of the United States, and then obtained a divorce from a competent court there for grounds recognized in England, but without personal notice to the husband, who had never been within the State, and whose domicile continued to be English; it was held that her re-marriage in America during the lifetime of her husband was invalid in England. Had the petitioner been legally domiciled in the State which granted the divorce it appears that the English courts could have recognized the decree. In this class of questions may be placed those which have arisen as to the jurisdiction of the court. Here four points are mentioned in the English text-books as material, viz., allegiance, the place of marriage, the place of domicile, and the place of the domicile (see Domestic. The court
has asserted its jurisdiction in the following cases:—when the allegiance and the place of marriage were English, the locus delicti and domicile foreign; when the allegiance and domicile were both English, and the locus communis et delicti foreign. It has been held that the court can inquire into the validity of a marriage in England between foreigners domiciled abroad at the time of the marriage. And when the marriage had been solemnized between foreigners in a foreign country, and the wife committed adultery abroad, the court held itself entitled to dissolve the marriage on the petition of the husband then domiciled in England. And in an Irish case it was held that the domicile of the husband will sustain the jurisdiction of the court over the wife though married abroad, always after marriage resident abroad, and accused of adultery committed abroad.

Questions of this sort have frequently arisen in American jurisprudence. The different States are to each other in the matter of divorce as foreign countries. The learned writer to whom we have already referred (Bishop, Marriage and Divorce, form, etc.) has the following propositions—1. The tribunals of a country have no jurisdiction in divorce, wherever the offence may have occurred, if neither of the parties has an actual bona fide domicile within its territory. 2. It is sufficient for one of the parties to be domiciled in the country, both need not be, neither need the situation where the domiciled party is plaintiff be served personally on the defendant, if such personal service cannot be made. 3. The place where the offence was committed is immaterial. 4. The domicile of the parties at the time of the offence is immaterial. 5. It is immaterial under what system of divorce laws the marriage was celebrated. The author holds that the foregoing doctrines are not in conflict with the United States constitution, but that they are made binding by that constitution on the tribunals of all the States. It has been pointed out, however, that the fourth proposition has been denied by the courts of Pennsylvania and New Hampshire, which hold that only the courts of that country where the parties were domiciled when the offence was committed have jurisdiction to dissolve marriage for such offence. Bishop finally holds that "if a court has jurisdiction in a divorce cause, valid according to the law of the State in which it is taken, and not obnoxious to principles of inter-State comity, and it pronounces a divorce, it is binding on all the other States of the Union. If there was the domicile necessary to give the jurisdiction, and the defendant appeared to the suit, then the judgment would be everywhere in our country of absolute force, both as to the status of marriage and as to alimony and other like property rights. If the plaintiff only had a domicile, and there was no notice to the defendant within the jurisdiction, then the decree could affect only the plaintiff's status of marriage" (E. S.)

DIX—DIXEY

DIX, George (1755–1800?), an English navigator, born in 1755. He served under Captain Cook in his third expedition, during which he had an opportunity of learning the commercial capabilities of the north-west coast of America, and was thus prompted to the expedition in connection with which his own name is celebrated. After his return from Cook's expedition he became a captain in the royal navy. In 1785 he offered his services to the King George's Sound Company of London in making a minute exploration of the north-west coast of America. His offer having been accepted, he set sail in the autumn of that year in command of the "Queen Charlotte,"—a companion ship, the "King George," being under the command of Captain Portlock. The voyage resulted in the discovery of numerous small islands, ports, and bays, of which Queen Charlotte's Island, Fort Mulgrave, Norfolk Bay, and Dixon's Archipelago may be named as the most important.

From North America he sailed to China, where he disposed of his cargo. He returned to England in 1788. In the following year he published an account of his voyage, entitled A Voyage round the World, but more particularly to the North-West Coast of America, the bulk of which consists of descriptive letters by William Beresford, his supercargo. His own contribution to the work included valuable charts and appendices. In 1791 he published The Navigator's Assistant. He died about 1800.

DIXFIELD, or DESFLE, formerly known as Andal-Mul, a town of Persia, in the province of Khorasan, 36 miles north-west of Shuster, on the right bank of the Shut-el-Diz, or Abzai, a tributary of the Karun, and there crossed by a fine bridge of twenty arches, the lower part of which is of ancient workmanship. It is the principal market of the province, and lies in a fertile district, productive of oranges, lemons, and indigo. The whole vicinity is full of the remains of ancient canals and buildings, which afford conclusive proof of former importance, and Mr. Layard identified the spot with the castle of Shele, or Oblivion, in which Shapur imprison the Armenian monarch Arsaces II. The popular identification of the ruins to the east with Jundi Shapur he regarded as a mistake. Population about 15,000.

DIMITRIEV, Ivan Ivanovich (1760–1837), a Russian statesman and poet, was born at his father's estate in the government of Simbirsk. In consequence of the revolt of Pugacheff, the family had to flee to St. Petersburg, and there Ivan was entered at the school of the Semenoff Guards, and afterwards obtained a post in the military service. On the accession of Paul to the imperial throne he quitted the army with the title of colonel; and his appointment as procurator for the senate was soon after renounced for the position of privy councillor. During the four years from 1810 to 1814 he served as minister of justice under the emperor Alexander, but at the close of this period he retired into private life, and though he lived more than twenty years, he never again took office, but occupied himself with his literary labours and the collection of books and works of art. In the matter of language he sided with Karamzin, and did good service by his own pen against the Old Slavonic party. His poems include songs, odes, satires, tales, epistles, &c., as well as the fables—partly original and partly translated from Fontaine, Florian, and Arnault—on which his fame chiefly rests. Several of his lyrics have become thoroughly popular from the readiness with which they can be sung; and a short dramatic and epic poem on Yermak, the Cossack conqueror of Siberia, is well known. His writings occupy three volumes in the first five editions; in the 6th (St. Petersburg, 1829) there are only two. His memoirs, to which he devoted the last years of his life, were published at Moscow in 1866.

DIMITROFF, a town of Russia, in the government of Moscow, 45 miles due north of the city of that name, in 56° 21' N. lat. and 37° 31'E. long., near the river Yakroma, a sub-tributary of the Volga. Besides the Cathedral of the Assumption and Parkaneue, an ancient building originally erected as a nunnery, it possesses seven churches, a monastery, a hospital, an almshouse, and factories for the manufacture of silk, wool, and cotton. The inhabitants also cultivate market-gardens for Moscow, and carry on a moderate trade in grain. The existence of Dimitroff is due to the grand-duke George Vladimirvitch, who happening, during his exile from Kreff, to receive on the spot the news of the birth of his son Demetrios, celebrated the event by founding the city and assigning it as an amansutiae for his child. Demetrios continued in possession till he was himself called to the grand-ducal dignity in 1177. In 1304 the town was the seat of a

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Dual diet; in 1656 it was visited by a terrible pestilence; and in the Polish-Lithuanian invasion it witnessed the defeat of Sapieha by Prince Ivan Karakun. Population in 1873, 8042.

DMITROVSK, a town of European Russia, in the government of Orel, near the Nerus, a sub-tributary of the Dnieper, about 57 miles south-west of the town of Orel, in 52° 30' N. lat. and 35° 4' E. long. It consists of about 700 wooden houses, has four churches and a hospital, manufactures soap, and deals in grain, hemp, linseed oil, and tallow. Dmitrovsk was founded by Demetrius Cantemir, the hospodar of Moldavia, who in 1711 received from Peter I. the district in which it stands in compensation for the 'loss he had sustained in Moldavia; and its first inhabitants consisted of Malo Russian and Wallachian immigrants. Population, 7600.

DNIEPER, the Borysthenes of the Greeks, Danapris of the Romans, Uzi of the Turks, Exki of the Tatars, Elce of Visconti's map (1381), Lenere of Contarini (1437), and Loes van of Bapista of Genoa (1514), is one of the most important rivers of Europe, ranking after the Volga and the Danube. It belongs to Russia, and takes its rise in the government of Smolensk, in a swampy district at the foot of the Smolensk Hills, not far from the Volga and the Dvina, in 55° 59' N. lat. and 33° 41' E. long. Its length is about 11,000 miles, and it drains an area of 242,000 square miles, which supports a population of upwards of twelve million inhabitants. In the first part of its course, which may be said to end at Dorogobush, it flows through an undulating country of Carboniferous formation; in the second it passes west to Orsha, south through the great fertile plain of Kishineff and Chernigow, and then south-east across the rocky steppe of the Ukraine to Ekaterinoslaff. About 45 miles south of this town it has to force its way across the same granitic offshoot of the Carpathians, which interrupts the course of the Dnieper at the Bug, and for a distance of about 40 miles rapid succeeds rapid. The whole fall of the river in that space is 155 feet,—the greatest of the ten distinctly marked rapids, that at Nenasitz, having an average of 3 inches in every 50 feet, and the smallest, or the Lastki Porog, about 1 inch of an inch in the same distance. The river having got clear of the rocks continues south-west through the grassy plains of Kherson and Tauris, and enters the Black Sea by means of a considerable estuary in 46° 21' N. lat. and 32° 20' E. long. The navigation of the Dnieper extends as far up as Dorogobush, where the depth is about 12 feet, and rafts are floated down from the higher reaches. About the town of Smolensk the breadth is 545 feet, at the confluence of the Pripat 1400, and in some parts of the Ekaterinoslaff district as much as 7000. In the course above the rapids the channel varies very greatly in nature and depth, and it is not unfrequently interrupted by shallows, no fewer than 55 being counted in the Kieff government alone. The rapids, or porogs, form a serious obstacle to navigation; it is only for a few weeks, when the river is in flood, that they are passable, and even then the venture is not without risk, and can only be undertaken with the assistance of the special pilots, who to the number of 3000 or 3000 have established themselves at Lotmanskaya-Kamenka and other places in the neighbourhood. As early as 1732 an attempt was made to improve the channel, and extensive operations have since been carried on from time to time. A canal, which ultimately proved too small for use, was constructed at Nenasitz in 1780 at private expense, but was stopped in 1793, and in 1805 a canal was formed at Kainadtski, and the channel rectified at Surk; by 1807 a new canal was completed at Nenasitz; in 1833 a passage was cleared through the Starokadntske Porog; and in the period from 1843 to 1853 a whole series of ameliorations were effected. The result has been not only greatly to diminish the dangers of the natural channel, but also to furnish a series of artificial canals by which vessels can make their way when the water is too low in the river. Between 1852 and 1857, 277 vessels and 674 rafts passed the rapids annually; and only 4 of these vessels came to grief. Within recent years the water in the river has been unusually low, but it is expected that the draining of the Piesk marsh may remedy the evil. Of the tributaries of the Dnieper the following are navigable,—the Bereina and the Pripsk from the right, and the Wewa and Soz and the Borosna and Desna from the left. In the upper parts of the river the fisheries are not of sufficient importance to constitute a separate occupation; but in the estuary they attract a large concourse of people from the neighbouring governments, and form almost the sole means of subsistence for the Swedish colonists. At Kieff the river is free from ice on an average 267 days in the year, at Ekaternoslaff 274, and at Kherson from 280 to 285.

DNISTEY, the Tyras of the classical authors, and the Turul of the Turks, a river of south-eastern Europe belonging to the basin of the Black Sea. It takes its rise on the northern slope of the Carpathian Mountains in the Samber circle of Galicia, and belongs for the first 330 miles of its course to Austrian, for the remaining 600 to Russian territory. In its excessive meandering it frequently almost returns to the same spot; for example, while the actual distance from Turunchuk to Mayakovsk is about 33 miles, the development of the river would require about 133. At the same time, as the average fall is from 25 to 26 inches in the mile, the current in most parts even during low water is pretty rapid, the mean rate per hour being calculated at 863 feet. The average width of the channel is from 360 to 700 feet, but in some places it attains as much as 1400 feet, the depth is various and changeable. The banks are usually about 3500 feet apart, but in certain reaches approach each other so as to leave room for nothing but the actual bed; their average height above the water in the Bessarabian portion is 350 feet. The principal interruption in the navigable portion of the river, besides the somewhat extensive shallows, is occasioned by a granitic spur from the Carpathians, and bears the name of the Yampolskie Porogi, or Yampol Rapids. For ordinary river-craft the passage of these rapids is rendered possible, but not free from danger, by a natural channel on the left side, and a larger and deeper artificial channel on the right; for steam-boats they form an insuperable barrier. The river falls into the sea by several shallow arms, of which the most important has a depth of only 2½ feet near its mouth; but the Turunchuk, an independent stream, disemboguing in the neighbourhood, has a depth of 7 or 8 feet, and is connected with the main channel of the Dnieper by the Surrovtszoff canal, so named after the merchant at whose expense it was constructed. There are two periodical floods in the river,—the first and greatest caused by the breaking up of the ice, and occurring in the latter part of February or in March; and the second, due to the melting of the snows of the Carpathians, and consequently taking place about June. The spring flood raises the level of the water 20 feet, and pours along so violent a current that large blocks of stone are drifted from their position; towards the mouth of the river gardens and vineyards are submerged, and the surface of the stream measures from four to six miles across. In some years the general state of the water is so low that navigation is possible only for three or four weeks, while in other years it is so high that navigation continues without interruption. Steamboat traffic was introduced in the lower reaches in 1840, when
the government vessel "Prince Vorontzoff" began to make regular trips between Ovidiopol and Akerman, and since that date it has acquired very considerable dimensions. The fisheries of the estuary are of some importance; and the lakes which are formed by the inundations of the valley furnish a valuable addition to the diet of the people in the shape of carp, pike, and tench. The principal towns on the river are Sambor, Khotin, Mohileff, Dubossari, Gregoropol, Bender, Traspol, and Akerman; its tributaries are numerous, but not of individual importance.

DOAB, or DUAB, or DOOAB, a name, like the Greek Mesopotamia, applicable, according to its derivation (do, two, and ab, river), to the stretch of country lying between any two rivers, as the Baroe Doab between the Sutlej and the Ravee, or the Bucchans Doab between the Ravee and the Chemab, but frequently employed, without any distinctive adjunct, as the proper name for the region between the Ganges and its great tributary the Jumna. In like manner the designation of Doab Canal is given to the artificial channel which breaks off from the Jumna near Fuzailpur, and flows almost parallel with the river till it reunites with it at Delhi.

DOBELL, STONEY (1824—1874), a distinguished English poet, born on the 5th of April 1824 at Cranbrook, Kent, was sprung from an old Sussex family, noted for its staunch loyalty in the struggle between the Cavaliers and Roundheads. His father, John Dobell, who wrote a pamphlet on Government, was a wine merchant at Cheltenham, his mother was a daughter of Samuel Thompson, a famous political reformer. When Dobell was twelve years old, the family went to Gloucestershire; and the poet, ever after, with occasional breaks, kept up his connection with the district. He was educated privately, and never attended either school or university. He refers to this in some precocious lines, in imitation of Chaucer, dating from his eighteenth year. In 1844 he married Emily Fordham, a lady of an old county family in Cambridgeshire. Cheltenham was, for the most part, his home in those early years, as his father's business had to be carried on; but the summer was often spent in the country. During this period his poetic vein flowed freely. He wrote a number of minor poems instinct with a passionate desire for political reform. The Roman was also in progress, and was written mainly among the Cotswolds. It appeared in 1850, under the name de plume of Sidney Yendys. Next year he travelled through Switzerland with his wife; and, after his return, he formed friendships with Robert Browning, Paul Lonsdale, George Macdonald, Emanuel Deutsch, Lord Houghton, Ruskin, Holman Hunt, Mazzini, Tennyson, and Carlyle, and conducted an interesting correspondence with Charlotte Bronte. His second large poem, Belder, written partly at Cowthorne, partly among the Alps, and finished at Amberley Hall, appeared in 1854. The three following years were spent in Scotland—the winters in Edinburgh, the summers in the Highlands. Here he endeavoured to an entirely new circle, including Dr John Brown, Dr Hanna, Hugh Miller, Sir Noel Paton, Sir James Y. Simpson, and Professor and Mrs Blackie. Perhaps his dearest friend at that time was Alexander Smith, in company with whom he published, in 1855, a number of sonnets on the Crimean War, which were followed by a volume on England in Time of War. The delivery of an elaborate lecture on the "Nature of Poetry" to the Edinburgh Philosophical Institution, in April 1857, seriously injured Dobell's chest. Accordingly he spent the winters of the four following years in the Isle of Wight, and, after 1862, the winter generally found him on the Continent, the summer in Gloucestershire. On one occasion, while near Naples, he fell through a thin crust of earth into some underground works, to a depth of about 12 feet. This accident proved injurious to his health; and, in 1869, a mare, which he was trying to break, fell and rolled over with him. After this he was, more or less, an invalid, and lived in Gloucestershire, preserving his devotion for natural beauty, his keen interest in public affairs, his sunny sweetness of temper, and deep religious feeling, till his death in 1874.

As a poet Dobell belongs to the "epic school," as it was happily named by Professor Ayton, who parodied its style in Formulan. The epistle, however, was first applied by Carlyle by Byron. The school includes the Rev. George Gilfillan, Philip James Bailey, Stanyan Baggs, Dobell, Alexander Smith, and, according to some critics, Gerald Massey. It is characterized by an under-current of discontent with the mystery of existence, by vain effort, unrewarded struggles, sceptical unrest, and an uneasy straining after some incomprehensible end. It thus faithfully reflects a prevalent phase of 19th century thought, and consequently is a perfectly legitimate exercise of the muse. Poetry of this kind is marked by an excess of metaphors, which darkness rather than illuminates, and a general extravagance of language. On the other hand, it manifests a freshness and originality, and a rich natural beauty, not often found in more conventional writings. In this school Dobell shares with Bailey the foremost place, and his genius received early recognition from the Rev. George Gilfillan. He is possessed by his ideal of what a poet ought to be. An intensely earnest spirit pervades all his works; and, like Milton and Wordsworth, he has no humour. We sometimes meet, in his writings, conceptions and obscures which remind us of Cowley and Dobell, and still often his intellectual subtlety, gorgeous imagery, and exquisite lyrics recall Shelley. The Roman, a poem dedicated to the interests of political liberty in Italy, is marked by pathos, energy, and passionate love of freedom; and its clear vivid style enchants the reader throughout. His treatment of the Colosseum has been compared, not unfavourably, with Byron's. The faults of the work arise almost entirely from the author's embarrassment in dealing with his own riches. The drama, too, is overlaid with monologue, which is carried to such a dreary excess in Belder—a poem so intensely subjective as to fail utterly in human interest. The gloomy egotism of the moody hero wearies most readers, but is relieved, from time to time, by some of the finest descriptions of nature in English poetry, by Amy's exquisitely touching songs, and by grander passages than any to be found in The Roman. There is a distinct off, however, in purity of style. The purpose of Belder has been strangely misunderstood by many critics; and some have actually identified the hero with the author. The object of the book is to show the evil moral effects of egotism and a lust for power on a man of genius. The passage on Chamouni is unsurpassed by Coleridge. Belder, still more than his other poems, manifests Dobell's wealth of thought, as well as the prodigal richness of his imagery. England in Time of War is the most pleasing of Dobell's works, and allows his lyrical impulse full scope. The book is steeped in passion, and gives faithful and poetical expression to the feelings of many English hearts at the time. In all Dobell's poems a great fondness for alteration is observable.

His chief prose writings have been collected and edited with an introductory note by Professor Nichol (Thoughts on Art, Philosophy, and Religion. London: Smith, Elder, and Co., 1876). The lecture on the "Nature of Poetry" is an elaborate disquisition in which a perfect poem is defined as "the perfect expression of a perfect mind." In his pamphlet on Reform, he maintains that a just national representation is such as represents the nation at its efficient duralbe best. In his memoranda for
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A projected play, the character of the cardinal is finely conceived. He was to have "no element not common to all men and no element as common to all men,—a life such as every man might lead but no man does lead,—in which the things done are not those which men do rarely, but the common acts of men done in a rare spirit." Dobell's prose writings are studded with such suggestive sentences as we have noted. The singular truth of his observations of nature is well seen in his description of the "Symptoms of the Dissolution of Night" (Thoughts, p. 83). His prose style lacks simplicity, both in the individual words used and in the structure of the sentences. The classical element is much too prominent in his vocabulary. In his religious views, Dobell was a Christian of the Broad Church type. Socially he was one of the most amiable and true-hearted of men. He will long be remembered as an admirable song-writer, a suggestive and original thinker, and an ardent lover of political liberty. The standard edition of his poems is edited by Professor Nichol of Glasgow University, who has profited to the work a beautiful in his written life.

DOBELN, a town of Saxony, in the circle of Leipzig, and 35 miles to the south east of that town, standing partly on an island formed by the Mulde. It is the centre of a considerable corn trade. The manufactures are cloth, cordwain and other leather, shoes, hats, belts lacquered tin ware, agricultural and weighing machines, and cigars. Population, 10,969 in 1875.

DOBERAN, or Dobberan, a market town of Northern Germany, in the grand duchy of Mecklenburg-Schwerin, about two miles from the shores of the Baltic, and seven west of Rostock. Besides the ruins of a Cistercian abbey, founded by Pribislav II, it possesses a church of the 14th century, which ranks as one of the finest in Northern Germany, a grand ducal palace, a theatre, an exchange, and a concert-room. In 1793 Duke Frederick Francis caused the first sea-side watering-place in Germany to be established on the neighbouring coast, at the spot where the Heiliger Damm, a great bank of rocks about 1000 feet broad and 15 feet high, stretches out into the sea and forms an excellent bathing ground. Though no longer so popular as in the early part of the century, it is still frequented. In the immediate neighbourhood of the town three mineral springs were discovered in 1829—one sulphurous, a second saline, and the third chalybeate. Population in 1875, 3866.

DOBRETEI, GABOR (i.e., GABRIEL) (1786-1851), an Hungarian philologist and antiquary, was born at Nagyszollos in 1786. He completed his studies at the universities of Wittenberg and Leipsic, and was afterwards engaged as a tutor in Transylvania. At this period he originated and edited the Erdélyi Múzeum, which, notwithstanding its important influence on the development of the Magyar language and literature, soon failed for want of support. In 1820 Dobrentei settled at Pesth, and there he spent the rest of his life. He held various official posts, but continued zealously to pursue the studies for which he had early shown a strong preference. His great work as the Ancient Monuments of the Magyar Language (Régi Magyar Nyelvemlékek), the editing of which was intrusted to him by the Hungarian Academy. The first volume was published in 1835 and the fifth was in course of preparation at the time of his death. Dobrentei was one of the twenty-two scholars appointed in 1825 to plan and organize, under the presidency of Count Teleki, the Hungarian Academy. In addition to his great work he wrote many valuable papers on historical and philological subjects, and many biographical notices of eminent Hungarians. These appeared in the Hungarian translation of Brockhaus's Conversations-Lexikon. He translated into Hungarian Macheek and other plays of Shakespeare, several of Schiller's tragedies, and Molière's Avers, and wrote several original poems. His article on "Magyar Literature" in the Conversations-Lexikon was translated into English. Dobrentei does not appear to have taken any part in the revolutionary movement of 1848. He died at his country house, near Pesth, March 28, 1851.

DOBRIHOFFER, MARTIN (1717-1791), a Roman Catholic missionary, whose fame is preserved by the historical interest and the literary character of his narrative. Born at Gratz, in Styria, he joined the Society of Jesus in 1736, and in 1749 proceeded to Paraguay, where for eighteen years, first among the Guarans, and latterly among the Abipones, he continued with steadfast devotion and easy cheerfulness to discharge the difficult and hazardous duties of his profession. Returning to Europe on the expulsion of the Jesuits from South America, he settled at Vienna, obtained the patronage, or rather the friendship, of Maria Theresa, survived the extinction of his order, continued the history of his mission, and died at Brussels on January 17, 1791. His history appeared at Vienna in 1784, in the author's own Latin, and in a German translation by Professor Krail of the university of Pesth. Of the contents of the work some idea may be obtained from its extended title:—Historia de Abiponibus, Exeunt Bellacognae Paraguayae Nationis, locupletata Captiosa Barbararum Gentium Urbium, Fluminum, Ferarium, Amphibiorum, Insectorum, Serpentum praecipuorum, Pacium, Avisum, Arborum, Plantarum altiorumque ejusdem Provinciae Observationum. The "lively singularity" and garrulous quaintness of the style could only be displayed by lengthened quotation. In 1822 there appeared in London an anonymous (not altogether complete) translation, which has not unfrequently been ascribed to Southey, but was really the work of Sara Coleridge, who, while still in her teens, had undertaken the task to defray the college expenses of one of her brothers. To the youthful translator a delites compliment was paid by Southey in the third canto of his Tale of Paraguay, the story of which was derived from the pages of Dobrihoff's narrative:—

"And if he could in Merlin's glass have seen
By whom his tomes to speak our tongues were taught,
The old man would have felt as pleased,
As when he won the ear of that great Empress Queen."

DOBROWSKY, JOSEPH (1753-1829), one of the earliest and greatest of Slavonic philologists, was born of Bohemian parentage at Gjermet, near Raab, in Hungary. He received his first education in the German school at Bischontznitz, made his first acquaintance with Bohemian at the Czechbrod gymnasium, studied for some time under the Jesuits at Klattau, and then proceeded to the university of Prague. In 1772 he was admitted among the Jesuits at Brünn; but on the dissolution of the order in 1773 he returned to Prague to study theology. After holding for some time the office of tutor in the family of Count Nostitz, he obtained an appointment first as vice-consul, and then as censor, at Hradisch; but in 1790 he lost his post through the abolition of the seminaries throughout Austria, and returned as a guest to the house of the count. In 1792 he was commissioned by the Bohemian Academy of Sciences to visit Stockholm, Abo, Petersburg, and Moscow in search of the manuscripts which had been scattered by the Thirty Years' War; and on his return he accompanied Count Nostitz to Switzerland and Italy. His reason began to give way in 1795, and in 1801 he had to be confined in a lunatic asylum; but by 1803 he had completely recovered. The rest of his life was mainly spent either in Prague or at the country-seats of his friends Counts Nostitz and Corinna; but his death took place at Brunn, whether he had gone in
1828 to make investigations in the library. While his fame rested chiefly on his philological labours, his botanical studies are not without value in the history of science. The following is a list of his more important works; and it will be observed that, dealing as they do, with Slavonic subjects, they are all composed in Latin or German:


DOBROUDJA, or DOBRUSCHIA, or Bulgarian Dobritch, is the district lying between the Black Sea and the lower reaches of the Danube, by which it is separated from Roumania. The southern part of its area and much of its miles is occupied by an irregular steppe stretching north from the Balkan range, while the northern belongs to the alluvial tract produced by the action of the river. The predominant element in its heterogeneous population, which is more than 160,000, consists of the Tartars, whose numbers have been greatly augmented by immigration since 1859; but there are also Turks, Bulgarians, Roumanians, Greeks, Armenians, Germans, and Jews, and all the various nationalities remain strictly distinct, and usually occupy more or less exclusively separate settlements. The principal places in the Dobrudja are Rassova, Hirsova, Matsch, Isakcha, and Tulcha on the Danube; Badabagh towards the north, which was formerly regarded as the chief town of the district; Kustendj, Mangalia, and Belzchik on the coast; Basarabj towards the south and some distance inland; and, finally, the new Tartar city of Meljadin, which has sprung up since 1860 on the railway between Tchernava and Kustendj. The strategic importance of the Dobrudja was recognized by the Romans, who in the reign of Trajan built a line of fortifications from the river near Rosseva to the coast near Kustendj; and in modern times it has been more than once utilized, especially during the Russian invasions of 1828, 1854, and 1857. See Peters, Grundlinien zur Geographie und Geologie der Dobrudja, Vienna, 1867-1868.

DOBSCHAU, or Domina, a town of Northern Hungary, in the county of Gomor, on the Dobrudja. In the vicinity are mines of iron, copper, cobalt, and mercury. Population, 5505 in 1869.

DOBSON, William (1610-1645), an English portrait and historical painter, born at London in 1610. His father was master of the Almication Office, but by his improvidence had been reduced to distress. The son was accordingly bound an apprentice to Peak, a stationer and picture dealer in Holborn Bridge; and while in his employment he began to copy the pictures of Titian and Van Dyck, whose manner he had retained. He also took portraits from life under the advice and instruction of Francis Cleyn, a German artist of considerable repute. Van Dyck, happening to pass a shop in Snow Hill where one of Dobson's pictures was exposed, sawed out the artist, and presented him to Charles I, who took Dobson under his protection, and not only sat to him several times for his portrait, but caused the prince of Wales, Prince Rupert, and many others, to do the same. The king had a high opinion of his artistic ability, styled him the English Titorell, and appointed him sergeant-painter on the death of Van Dyck. After the fall of Charles, Dobson was reduced to great poverty, and fell into dissolute habits. He died at the early age of thirty-six. Excellent examples of Dobson's portraits are to be seen at Blenheim, Chatsworth, and several other country seats throughout England. The head in the Decollation of St John the Baptist at Wilton is said to be a portrait of Prince Rupert.

DODCTE (from Dōctē), a name applied to those heretics in the early Christian church who held that Christ, during his life, had not a real or natural, but only an apparent or phantom body. Other explanations of the Docetism, or appearance, have, however, been suggested, and in the absence of any statement by those who first used the word of the grounds on which they did so, it is impossible to determine between them with certainty. The name Docetism is used by Clement of Alexandria as the designation of a distinct sect, of which he says that Julius Cassimus was the founder. Docetism, however, undoubtedly existed before the time of Cassimus. The origin of the heresy is to be sought in the Greek, Alexandrine, and Oriental philosophizing about the imperfection or rather the essential impurity of matter. Traces of a Jewish Docetism are to be found in Philo, and in the Christian form it is generally supposed to be comulated in the writings of John, and more especially in the epistles of Ignatius. It differed much in its complexion according to the points of view adopted by the different authors. Among the Gnostics and Manicheans it existed in its most developed type, and in a miller form it is to be found even in the writings of the orthodox teachers. The more thoroughly Docetism assumed the position that Christ was born without any participation of matter, and that all the acts and sufferings of his human nature, including the crucifixion, were only apparent. They denied, accordingly, the assumption of a truly human body. Amongst these were Valentinians, Bardesanians, Basilides Tatianus, and their followers. They praised considerably in their estimation of the share which this body had in the real actions and sufferings of Christ. Clement and Origen, at the head of the Alexandrian school, took a somewhat subtle view of the incarnation, and Docetism pervades their controversies with the Monophysites. Docetism tendencies have also been developed in later periods of the church's history, for example by the Priscillians and the Bogomiles, and also since the Reformations by Jacob Bohme, Menno Simons, and a small fraction of the Anabaptists. Docetism springs from the same roots as Gnosticism, and the Gnostics generally held Docetism views. Accordingly, for a fuller account of the principles out of which Docetism arose, and of the various modifications it assumed, the reader is referred to the article Gnosticism. See also the articles on the leading Docetism mentioned above.

DOCK, the name applied to the plants constituting the section Lappathum of the genus Rumex, and natural order Polygonaceae. The leaves of the docks are pinnate-vened, and are never sagittate or hastate; the flowers, which are arranged in two to five rows, in alternate fascicles similar to whorls, are generally perfect, and have three free styles, multifid stigmas, six stamens, and the three inner perianth-segments or petals in some cases tubercled, the fruit is an achene (see vol. iv. p. 150). In the common or broad-leaved Dock Rumex obtusifolius, the flower-stem is erect, branching, and 18 inches to 3 feet high, with large radical leaves, heart-shaped at the base, and more or less blut, the other leaves are more pointed, and have shorter stalks. The whorls are many-flowered, close to the stem, and mostly leafless. The root is many-headed, black externally, and yellow within. The flowers appear from June to
August. In autumn the whole plant may become of a bright red colour. It is a troublesome weed, common by roadsides and in fields, pastures, and waste places through-out Europe. An infusion of its root has been used as a remedy for ichthyosis; in large quantities it acts as a purgative. The powdered root is sometimes employed as a dentifrice. The Great Water Dock, R. Hydrolapathum, belonging to be the herb britannica Play (Nat. Hist., xxv. 6), is a tall-growing species, its root is used as an antiscorbutic. The root of the Curled Dock, R. crispus, affords an ointment and decoction reputed to be cures for scabies; and the seeds of the same species have been found efficacious in dysentery. Other British species are the Sharp Dock, R. capillipes, the root of which has been employed in dyeing; the Bloody-reined Dock, or Bloodwort, R. sanguineus; the Yellow Marsh Dock, R. palustris; the Fiddle Dock, R. palustris; the Golden Dock, R. martimurum, the Grainless Curled Dock, R. domestica (= aquaticus); and the Meadow Dock, R. pratensis, species. R. alpinus, or "Monk’s Rhubarb," was early cultivated in Great Britain, and was accounted an excellent remedy for ague.

DOCK. See Harbours.

DOCKYARDS. Previously to the reign of Henry VIII., the kings of England had neither naval arsenals nor dockyards, nor any regular establishment of civil or naval officers to provide ships of war, or to man them; they had admirals, however, possessing a high jurisdiction and very great power (see the article Admiral). There are strong evidences of the existence of dockyards, or of something answering thereto, at very early dates, at Rye, Shoreham, and Winchelsea. In November 1243 the sheriff of Sussex was ordered to enlarge the house at Rye in which the king’s galleys were kept, so that it might contain seven galleys. In 1238 the keepers of some of the king’s galleys were directed to cause those vessels to be breasted, and a house to be built at Winchelsea for their safe custody. In 1254 the baliffs of Winchelsea and Rye were ordered to repair the buildings in which the king’s galleys were kept at Rye. At Portsmouth and at Southampton there seem to have been at all times depôts both for ships and stores, though there was no regular dockyard. At Portsmouth till the reign of Henry VIII. it would appear, from a very curious poem in Hakluyt’s Collections, called The Policie of Keeping the Sea, that Henry V. had ships, officers, and men exclusively appropriated to his service, and independently of those which the Cinque Ports were bound, and the other ports were occasionally called upon, to furnish on any emergency. By this poem it also appears that Little Hampton, until as it now is, was the port at which Henry built his great Dromons.

Which passed other great ships of the common.

The dromon, "dromon," or "dromedary," was a large war ship, the prototype of which was furnished by the Saracens. Roger de Hoveden, Richard of Devizes, and Peter de Longtoft celebrate the struggle which Richard I. in the "Trinch the Mer," on his way to Palestine, had with a huge dromon,—a "marvellous ship! a ship than which, except Noah’s ship, none greater was ever read of." This vessel had three masts, was very high out of the water, and is said to have had 1500 men on board. It required the united force of the king’s galleys, and an obstinate fight, to capture the dromon.

The foundation of a regular navy, by the establishment of dockyards, and the formation of a board, consisting of certain commissionners for the management of its affairs, was first laid by Henry VIII.; the first dockyard erected during his reign was that of Woolwich. Those of Portsmouth, Deptford, Chatham, and Sheerness followed in succession. Plymouth was founded by William III. Pembroke was established in 1814, a small yard having previously existed at Milford.

From the first establishment of the dockyards to the present time, most of them have gradually been enlarged and improved by a succession of expedients and make-shifts, which answered the purposes of the moment, but the best of them have not possessed those conveniences and advantages which might be obtained from a dockyard systematically laid out on a uniform and consistent plan, with its wharfs, basins, docks, slips, magazines, and workshops arranged according to certain fixed principles, calculated to produce conveniences, economy, and despatch.

Neither at the time our dockyards were first established, nor at any subsequent periods of their enlargement, could it have been foreseen what incalculable advantages would one day be derived from the substitution of machinery for human labour; and without a reference to this vast improvement in all branch of naval operations, it could not be expected that any provision was be made for its future introduction; on the contrary, the docks and slips, the workshops and storehouses, were successively built at random, and placed wherever a vacant space would most conveniently admit them, and in such a manner as in most cases to render the subsequent introduction of machinery, and railways, and those various contrivances found in large private manufacturing establishments, quite impossible, even in the most commodious of Her Majesty’s dockyards.

From a brief description of the royal dockyards as they now stand a general idea may be formed of their capacities, advantages, and defects. Taking them in succession, according to their vicinities to the capital, the first is Deptford.—Deptford dockyard was first established about the year 1513, and continued to be a building yard, as well as a large depot for naval stores, until 1869, when it was closed as a building yard in pursuance of a recommendation of a committee of the House of Commons, which reported in 1864. The increasing size of ships of war rendered the yard unsuitable for any but the smaller types of vessels, while the continuous deposits of river mud, not only along the frontage but also in the docks and basins, rendered it a costly and decreasingly valuable place of construction. It had an interesting history. Not only were some of the most celebrated ships of the navy built there, but during the Great Plague the office of the Admiralty was removed thither from Seething Lane. Peter the Great worked in the yard as a shipwright, dwelling the while at Sayes Court, the residence of Evelyn, the author of Syphilis and of the diary not less famous than Pepys’s. Evelyn was the greatest of some of the ground on which the dockyard stood, for no other consideration than that there should always be a keel laid down in the yard. Queen Elizabeth’s Admiralty officials were at one time resident at Deptford; and thither went the queen in 1580 to confer the honour of knighthood on Sir Francis Drake, and to dine with the admiral on board the ship in which he had circumnavigated the world.

Though closed as a building yard in 1869, in accordance with the recommendation of a committee of the House of Commons, part of the establishment, with suitable storehouses, was retained as a depot for naval stores, and as the one place from which shipments of stores to naval depots abroad should be made. Of the residue, part was sold to Mr Evelyn, who made the purchased part into a recreation ground for the Deptford people, and gave it to them. The rest was sold for a metropolitan meat market to the Corporation of London. When taken the front or wharf sides of this dockyard, facing the Thames, were 1300 feet in length, and the mean breadth of the yard 650 feet; the superficial content about 30 acres. It had three slips
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4 for ships of the line on the face next the river; and two for smaller vessels, which launched into a basin or wet dock, 260 by 220 feet. There were also three dry docks,—one of them a double dock, communicating with the Thames, and the other a smaller one, opening into the basin. The number of men employed in this yard, in time of war, was about 1500, of whom one-half were shipwrights and artificers, and the other half labourers. There were, besides, 18 or 20 teams of 4 horses each, to drag timber and heavy stores.

The proximity of Deptford yard to the capital is of great importance, in the convenience it affords for receiving from this great mart all the home manufactures and products which may be purchased for the use of the navy. It is the general magazine of stores and necessaries for the fleet, whence they are shipped off, as occasion requires, to the home yards, the outports, and the foreign stations, in store-ships, transports, coasting ships, lighters, and launches, according to the distance they have to be sent.

The management of Deptford naval store yard is now merged with that of the victualling-yard, for a most complete establishment of its kind. Till 1869 this management comprised a naval captain superintendent, with a master in the navy as his assistant. Under them a storekeeper, a store receiver, an accountant, an inspector of stores, and their respective staffs, conducted the administrative duties of the place. In 1869 the Board of Admiralty, in accordance with the recommendations of a departmental committee, abolished the offices of captain superintendent and master attendant, and placed the establishment under the civil management of the storekeeper. The naval superintendents were appointed for five years, and after that time were withdrawn to make way for others. The superintending storekeeper is appointed as a permanent officer, and under him experience is accumulated and applied in all the manufactories and other business departments of the yard. The manufacturers conducted by him and for the Government at Deptford comprise biscuit making on such a scale as to supply, with the yield of the victualling yard at Gosport and Plymouth, biscuit enough for the whole navy, and also chocolate making, mustard making, flour grinding, and the operations of a large cooperage. Most of the salt beef required for the navy is salted and put up there. Deptford may be called the heart of the victualling service. From its stores are shipped the whole of the consignments required for replenishment of depots abroad, as well as the requirements of the other two victualling yards in England. There is no place at that at the last-named the supplies of biscuit and flour are provided on the spot. The number of men employed at Deptford necessarily varies. During war upwards of a thousand men are required. The space occupied by the victualling yard is about 15 acres. There is a river frontage of 1700 feet, and a mean depth of 1600 feet. In 1877 there were employed in the naval store and victualling yard at Deptford 205 men on the establishment, and 390 men on the hired list, at a cost of £25,847.

Woolwich Dockyard.—This no longer exists as a naval station. Though retaining its name, it remains as a depot in the hands of the War Department, for whose work its river frontage of 3650 feet, and its docks and basins, afford excellent accommodation. Woolwich was the first and most ancient of all the dockyards, having been established in the reign of Henry VII. From it have been launched some of the finest and most celebrated ships of the English navy. In 1512 the “Harry Grace de Dieu” was built, and in 1552 was accidentally burnt. In more modern times the “Nelson” and the “Ocean” were from Woolwich, and those latest specimens of the new extent class of fighting ship, the “Trafalgar,” “Agamemnon,” and “Royal Albert.” As an establishment for the building and repair of ships, especially steam ships, Woolwich was perhaps the complete and best furnished of all the dockyards. Its power to make and repair engines and all iron work, whether of ship or fittings, was so extensive as to enable the Government before the introduction of iron-clads, to be nearly independent of the private trade. With occupation for 1500 workmen, it was able to rely upon its own resources almost exclusively. Its proximity to London gave it other great advantages, including this, that the Admiralty were thereby enabled the more easily to superintend the constructive work for which its artisans were responsible. But for the fatal operation of two causes, the increased and increasing depth of ships of war, and the continuous siltng of the river into the docks and basins of the yard, Woolwich would probably have remained one of the chief dockyards. Both these causes, however, operated. The depth of the “Nelson’s” hold had to be lessened in order to ensure her passing Erith, and it was stated in the Eighth Report of the Select Committee on Finance (1818) that “the wharf wall at Woolwich, owing to the action of the tide on the foundation, is in a failing state, and in danger of being swept into the river,” it being secured only in a temporary manner, and requires to be immediately rebuilt in a direction that will preserve it from similar injury hereafter, and prevent, in a great degree, that accumulation of mud which has, in the course of the last ten years, occasioned an expense of upwards of £125,692, and would threaten in time to render the yard useless.” Till 1869, however, notwithstanding the recommendations of a parliamentary committee, and the frequent urgings of members on both sides of the House of Commons, Woolwich yard was kept open. Then, in accordance with a policy long commended, it was closed, steps were taken to dispose of the plant and materials that remained, and the place itself was handed over, with its workshops and factories, to the War Department in 1872.

Woolwich Division of Royal Marines.—About the same time that the dockyard was broken up, the division of marines—no longer in contact with ships and shipping—was abolished, and its strength was distributed between the divisions at Chatham and Plymouth.

Chatham Dockyard.—This dockyard, founded by Queen Elizabeth, though not on the present site, is situated on the right bank of the Medway, to which it presents a line of wharfage extending 10,000 feet, and of embarkment 4500 feet more. The superficial contents may be estimated at about 500 acres. The old part of the yard has seven building-slips on the front, from which ships are launched into the river, all equal to the building of ships of the line, and three others for frigates and smaller vessels. In the same front are four dry docks communicating with the Medway. At the southern extremity of the yard is the shipyard, 1248 feet in length and 472 feet in width, in which are employed about 250 persons. It is equal to the manufacture of every description of cordage required for the naval service, including the largest size cable. The hemp houses, 300 feet long by 36 feet wide, are equal to the stowage of 1600 tons of hemp and 3000 hanks of yarn. Next to these are the slips and docks, with the working-sheds and artificers’ shops close in the rear, an excellent smithery, timber-berths, seasoning sheds, deal and iron yard, &c., and beyond these, on the eastern extremity of the yard, the officers’ houses and gardens.

The superintendent’s house is situated nearly in the centre of the yard. The lower or north-eastern part of the old yard is occupied by mast-ponds, mast-houses and slips, store-boat houses and slips, ballast wharf, timber-berths, and saw-pits.

Before the construction of the extension works in 1867–73, there was no dock or basin in Chatham yard; but the
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Medway, flowing along it in a fine sheet of water, in some degree answered the purpose of one. Owing to the shallowness of the water and the crooked navigation from Chatham round Upnor Point, ships were obliged to take in the river at the Eddes at one place, their stores and provisions at another, their guns, powder, and ammunition at a third; in consequence of which, a ship was usually longer in getting out to sea from Chatham than even from Deptford.

The necessity of improving the accommodation at Chatham forced itself upon the attention of those who were responsible for the navy many years before the opportunity came for effecting the improvements. Pepys records a visit to Chatham in July 1663, to inspect the site of a projected wet dock. It was estimated to cost £10,000, and Pepys remarked that “the place indeed is likely to be a very fit place when the king hath money to do it with.” In effect, however, it was not taken in hand by the king, who allowed the Dutch, instead of docks, to be found in the Medway. It was not till 1667 that ground was broken for the extension works at Chatham, though the plans had been prepared and certain preparations made many months before, under the supervision of Colonel Sir Andrew Clarke, C.B. The extension works may be thus described. Three basins give access from Gillingham Reach, which formerly connected the mainland with the salt marshes. These marshes were covered with water every spring tide. The Government bought 150 acres of them, and proceeded to re-make the ground which forms the site of the new dockyard workshops and factories. The three basins communicate with each other by caissons, so that ships of the largest class can pass from the bend of the Medway at Gillingham to that at Upnor. Upnor Reach entrance, opposite Upnor Castle, is 80 feet wide, the others are 84 feet. The first (Upnor) basin is the repairing basin, which has an area of 22 acres, and a depth, in common with the others, of 33 feet at spring, and 30 feet at neap tides. On the south side of this basin, and opening into it, are four graving docks, each capable of receiving the largest man of war. From this basin a passage about 175 feet long leads to the “factory” basin, which has an area of 20 acres. Contiguous to it are being erected the engine and boiler factories, and the principal workshops necessary for iron war-ship building. Next to the “factory” basin is the fitting-out basin, with an area of 28 acres. In this place ships preserve their sea stores and are got ready for service. Here, too, they will be dismantled and paid out of commission.

Very great engineering difficulties had to be contended against in prosecuting these works, owing chiefly to the soft mud and to the treacherous character of the ground on which foundations had to be laid. Congest labour was largely employed in the work of excavation, and in the manufacture of bricks, whereof 20,000,000 a year were turned out, at small cost, on the spot. The cost of these new works is reckoned at about £2,000,000.

A considerable piece of new ground (about 2000 feet in length by 200 in breadth) was added a few years ago to the upper part of the present Chatham dockyard, on which Mr Brunel erected one of the most perfect sawmills in the United Kingdom. It is supposed to be equal to the power of fifty saw-pits and nearly one hundred sawyers, and is capable of supplying the dockyards of Chatham and Sheerness with all the straight sawn timber they can require.

But the great advantage of the plan is in its application of the steam engine to the management and arrangement of timber, by which the labour and expense of a great number of horses are saved, and the obstruction and impediments to the general services of the yard avoided.

Since the introduction of iron as the material for ships hulls, Chatham has taken a more prominent place amongst dockyards. Most of the iron ships built in the royal yards have been built at Chatham and Pembroke,—the capabilities being greater at Chatham, where the “Achilles,” “Monarch,” “Clutton,” “Rupert,” “Raleigh,” “Dellerephon,” “Sultan,” “Alexandra,” “Temeraire,” and many of the Musquito fleet of gunboats were built. At Chatham and Devonport the whole of the ordnance required for the navy is manufactured; and, since 1869, the whole business of remanufacturing copper and old iron for the navy has been concentrated at Chatham.

The first division of royal marine, consisting of twenty-eight companies, is stationed at Chatham, in excellent barracks, situated near one of the extremities of the dockyard, and occupying nine acres of ground. There was formerly a small victualling depot, situated partly in the parish of Chatham and partly in that of Rochester, from which the ships at Chatham and at Sheerness and the Nore received a supply of provisions and water. Ships now obtain their supplies from Deptford, except fresh meat and vegetables, which are obtained on local contracts on demand.

It may be found necessary to establish a fresh depot for victualling stores at Chatham when the port becomes developed as a place for fitting out and repairing as well as for building. This process of development is going on rapidly. In March 1873 the executive of the Sheerness steam reserve with their ship were removed to Chatham, and the steps necessary for transferring the principal powers and attributes of the exposed dockyard at Sheerness to the strongly defended port of Chatham will be quickly taken. The great difficulties of navigation in the Medway, combined with the successive forts and torpedo stations which guard the river, are calculated to make Chatham unsuitable. As Hollingshed said of Lundy Island, there will be “no entrance but for friends.” When the Chatham works shall have been finished, the question will probably be revived whether Sheerness should not, as has been often recommended, be closed; but the advantages of having even a small yard whither ships only slightly injured by sea or by the enemy can run for repair, without having to thread the reaches of the Medway up and down, are so great that it is unlikely the place will be abandoned.

In 1876 Chatham dockyard was raised to a rear-admiral’s command. The number of workmen employed at Chatham yard in 1877 is 1478, established and 2022 hired men, at an aggregate cost of £230,158.

SHEERNESS DOCKYARD.—This dockyard is situated on a low point of land on the island of Sheppey, of which the soil is composed of sand and mud brought from the sea on the one side, and down the Medway on the other, and has so much contorted the mouth of that river as completely to command the entrance of it. The situation, in a military point of view, is a most important one, particularly from its vicinity to the North Sea and to the anchorage at the Nore; by which anchorage, and by the works of Sheerness, the mouths of the Thames and the Medway are completely defended.

As a situation for a dock, the objections to which it was liable are now in a great measure removed. On account of the low swampy ground on which it stood, fevers and agues were at one time so prevalent that shipwrights and other artificers were literally impressed and compelled to work at Sheerness. In 1857, as soon as that town sprang up close to the dockyard, and with it some little improvement by drainage, embankments, and other measures, it continued, for a considerable time, an unhealthy and disagreeable place. As a dockyard it was totally destitute of all convenience or arrangement; and
the whole premises, walled around wharfs and buildings belonging to the Ordnance Department, did not cover more than 15 acres. The storehouses were dispersed in various parts of this space, and in so ramous a state, that a ship hauled up in the mud was by far the best storehouse in the whole yard. There were two small inconvenient docks for frigates or smaller vessels. It was in fact a mere port of refitment, and might be considered as an appendage to Chatham.

The very limited capacity of Sheerness, and other considerations, led to the origination of the project of a naval arsenal at Northfleet, which, from change of circumstances, and from the important improvements now carried out at Sheerness, is not likely ever again to be revived. These improvements were of sufficient magnitude to render any establishment at Northfleet wholly unnecessary, by making Sheerness a very complete dockyard. Previously to carrying into execution this important undertaking, a committee of engineers and others was appointed, whose plan was afterwards submitted to the Privy Council, and with some slight improvements adopted. The first stone was laid on the 19th August 1814, and the whole work was completed at an expense not far short of one million sterling. The additions, together with some part of the premises held by the War Department, make the whole area of the dockyard of Sheerness amount to upwards of 50 acres. The wharf wall on the south side of the basin in front of the mast-houses is 100 feet, and that on the river front 60 feet in width, lined on both sides with as complete a specimen of good and beautiful masonry of granite as any in the kingdom.

Portsmouth Dockyard.—Portsmouth dockyard, founded by Henry VII, will always be considered as the grand naval arsenal of England, and the headquarters or general rendezvous of the British fleet. It appears at all times to have been regarded as an important naval station, notwithstanding the rivalry of Southampton, which was the principal port in Plantagenet times. In 1225 an order was issued to the barons of the Cinque Ports to provide men for the king's galleys at Portsmouth. In 1225 the sum of £25, 14s. 4d. was paid to the masters and crews of the "king's two great ships at Portsmouth." In 1229 £10 was paid to the king's clerk for the repair of the king's galleys and great ship at Portsmouth. King John on several occasions assembled his barons at Portsmouth for naval expeditions. He seems, moreover, to have aimed at increasing the accommodation there for ships. In May 1212 the sheriff of Southampton was commanded to cause the docks at Portsmouth to be inclosed with a strong wall, in the manner which the archdeacon of Taunton would point out, for the preservation of the king's ships and galleys. He was also to cause shed-houses to be erected for their stores and tackle. This was to be done immediately, lest the galleys or their stores should be injured in the coming winter.

In 1540, when the dockyard seems to have been regularly established, the area of the yard was comprised in 8 acres of ground, and abutting upon the harbour near what are now known as the King's Stauns. Cromwell added 2 acres in 1658, Charles II. added 8 in 1663, and 10 more in 1667. Between 1667 and 1710, 30 acres were reclaimed from harbour mud, or bought from the town, and various subsequent additions gave 30 acres as the area on which Portsmouth dockyard stood at the end of the last century. Early in Queen Victoria's reign the growth of the steam navy necessitated an enlargement of dock accommodation. In 1843 were ordered, and in 1848 were opened a fine steam basin holding 27 acres of water, and four deep docks, the dockyard ground being extended to 115 acres in all. A few years more and the want of dock room was as great as ever. Huge iron-clads, of a draught and length greater than had yet been known, required new docks and basins of special construction. The extension works at Chatham (see above) and Portsmouth were accordingly entered upon. At the present time (1877) great progress has been made with both sets of works, under the direction of Colonel Sir A. Clarke, C.B., R.E. and Colonel Pasley, R.E. When finished the Portsmouth new works will comprise a tidal basin, three floating basins (upon one of which four docks will abut), a large deep dock, entered from the tidal basin, two floating basin entrance locks, which may also be used as deep docks, and greatly increased wharfage and space for building storehouses and factories. The system of docks and basins will begin with the tidal basin, entered from the harbour by an opening 100 yards wide, and having a depth of 30 feet of water at low spring tides. The deep dock and the two locks at the head of this basin will carry 28 feet of water over the invert at low spring tides, the latter will be by an entrance between the tidal basins, three floating basins, which will lead from each other in the order named. These locks will in themselves be magnificent docks, able to receive the largest iron-clad at once from the tidal basin. They will lead to the repairing basin, a vast excavation, of a parallelogram shape, which will measure 22 acres, and carry at high spring tides 33 feet of water. This depth of water will be common to the three basins, it may be made permanent by the closing of the lock gates, and one great use of the locks will be that vessels may be docked in them in any state of the tide without lowering the level of water in the inner basins, where the tide may be ponded at its highest level of 35 feet of water, if necessary. Having been raised to this level in the locks by ingress of water from the tidal basin, vessels will be able to pass inwards to the repairing and other basins without any lessening of the depth of water. The four large docks of the repairing basin will have a depth of 30 feet of water on their sills, even when filled at high neap tides. Two of them are entirely finished, and the excavation of the others is far advanced. Opposite to these docks will be the entrance to the rigging basin, an excavation of 14 acres, in a trapezoid shape. The third, or fitting-out basin, which will receive the ships when they have been repaired and rigg'd, will be a pentagon of 14 acres. On one side of this basin there will be a coal depot, so that vessels may leave the docks with their coals on board, ready to go to sea. In addition to these four basins and seven docks there is an entrance between the tidal basin of the new works and the steam basin of 1814, which will connect the old and new portions of the dockyard; and, as for wharfage, the harbour or north wall of the extension works will have 26 feet and the wall of the tidal basin 30 feet of water alongside it at low spring tides, making altogether three miles of wharfage accommodation in connection with the extension works, and that for ships of the largest class. The size of the whole dockyard will be more than doubled, for its present 115 acres will be the entry by more than 173 acres of reclaimed mud land and various fortifications glass, making in all an exact measurement of 293 acres. 2 roads and 29 perches. These great works were estimated when designed in 1865 to cost £3,000,000, exclusive of convict labour. They have given employment on the spot to upwards of 1600 free men and about 800 convicts. The latter are employed in brick-making, and have made upwards of 100,000,000 bricks since the works were begun.

A complete network of railway connects all parts of the yard with the docks and basins, and the whole of the neighbouring railroad to all parts of the kingdom, so that iron or coal can be put into wagons at Sheffield or Cardiff.
and brought in a few hours, without change of medium, to the side of the slip which is to use the material.

The dockyard, accordingly, is by far the most capacious of all; and the safe and extensive harbour, the noble anchorage at Spithead, the central situation with respect to the English Channel and the opposite coast of France, render Portsmouth the very first importance as a naval station; and in the view of it, every possible attention appears to have been paid to the extension and improvement of its dockyard.

In the centre of the old wharf-wall, facing the harbour, is the entrance into the great basin, whose dimensions are 380 by 260 feet, and its area 2½ acres. Into this basin open four excellent dry docks, and on each of its sides is a dry dock opening into the harbour; and all of these six docks are capable of receiving ships of the largest class. Besides these is a double dock for frigates, the stern dock communicating through a lock with the harbour, and the head dock with another basin about 250 feet square. There is also a camber, with a wharf-wall on each side, 500 feet in length, and of sufficient width to admit of transports and merchant ships bringing stores to the dock-yard. In the same face of the yard are three building slips capable of receiving the largest ships, and a small one for sloops, besides two building slips for frigates on the northern face of the yard, and a smaller slip for sloops. The range of storehouses on the north-east side, and the rigging-house and sail-loft on the south-west side of the camber are magnificent buildings, the former occupying nearly 600 feet in length, exclusive of the two intermediate spaces, and nearly 60 feet in width, and the two latter 400 feet. The sea-store houses occupy a line of building which, with the three narrow openings between them of 25 feet each, extend 800 feet. The rope-house, tarring-house, and other appendages of the ropery are on the same scale, but since the suppression of the Portsmouth ropery (in 1869), and the concentration of rope-making at Deptford and Chatham, these premises have been used as general storehouses. The two sets of quadrangular storehouses, and the two corresponding buildings, with the intervening timber-beths and saw-pits, at the head of the dry docks, issuing from the great basin, are all excellent, and conveniently placed. The smithery is on a large scale, and contiguous to it are the various factories for metal work used in the building and repair of iron ships. Formerly there was also a copper mill, capable of turning out 300,000 sheets a year, besides bolts, bars, and gudgeons for ships’ use. But since 1869 the whole business of remaking old metal of whatever kind has been concentrated at Chatham. Most of these factories were constructed under the direction of General Beaulham. At the head of the north dock are the wood mills, at which every article of turnery, rabeting, &c., is performed for the use of the navy, from boring the chambert of a pump to the turning of a button for a chest of drawers. But the principal part of these mills is the remarkable machinery for making blocks, contrived by Drulcn (see Block-Machinery).

The northern extremity of the dock-yard is chiefly occupied with sawmills, and the timber-beths, the working boat-house, and boat store-house. On the eastern extremity are situated the houses and gardens of the superintendent and principal officers of the yard, the chapel, and the late royal naval college.

Portsmouth yard, in 1877, employs 4910 men, at a cost of £224,814.

Naval College — The establishment of a college at Portsmouth for the education of young gentlemen for the navy was first formed in 1729 under the title of the Naval Academy. It contained 40 scholars, the sons of the nobility and gentry. In 1806 it was reorganized under the name of the Royal Naval College, and the number of scholars was raised from 40 to 70; of whom 40 were to consist of the sons of commissioned officers of the navy, and to receive their board, clothing, lodging, and education free of all expense; the remainder to consist of sons of noblemen, gentlemen, civil and military officers, on payment of £72 a year. The age of admission was from twelve and a half to fourteen years. No student to remain at college longer than three years; at the end of which time, or sooner if he should have completed the plan of education, he was to be discharged into one of Her Majesty’s ships, the college time being reckoned two years of the six required to be served to qualify for such a commission. In 1837 the Royal Naval College for the education of young gentlemen for the navy was abolished, and by an order in council of 1838 it was reopened as an establishment for the scientific education of a certain number of officers and mates of the naval service, the latter to have passed both their examinations in seamanship and in navigation, and to remain one year in the college. A limited number of commissioned officers of any rank were also admitted to study at the college, but no expense was incurred on their account.

Naval Architectural School — The number of students formerly did not exceed 24. Candidates were admitted by examination at stated periods, the age of entrance being from fifteen to seventeen, and the duration of apprenticeship seven years. At the expiration of their apprenticeship they were eligible to all the situations in the ship-building department of her Majesty’s dockyards, to be there employed as supernumeraries until regular vacancies might occur. This school, which was subsequently embodied with South Kensington, is now incorporated with Greenwich College.

Vaucelling Yard — There were formerly two victualling establishments at this port,—the one in Portsmouth town, the other across the harbour, at a place called Weevil,—both of them inconveniently situated for supplying the ships with water and provisions, more especially such as had to take them on board at Spithead. The former consisted chiefly of provision-shops and magazine, with a tedeem and a bakery; at the latter there were a cooperage and a brewery. The victualling establishments are now consolidated at Gosport, and the Royal Clarence Victualling

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1 On 1st February 1873 Portsmouth College was superseded by the Royal Naval College at Greenwich. The means of education provided at Portsmouth were once too limited and not technical enough. The charmed buildings of Greenwich were required, and the system of higher education of naval officers, which was pronounced by the select committee on that subject to be necessary, was considered and carried out by Mr Goschen, then first lord of the Admiralty. Rear-admiral Sir Cooper Key, K.C.B., was the first president of the college. The minute of the Board of Admiraity consequent upon the Order in Council of 16th January 1873, whereby Greenwich College was founded, states that—"My Lords intend that the Royal Naval College at Greenwich shall be so organized as to provide for the education of naval officers of all ranks above that of midshipmen, in all branches of theoretical and scientific study bearing upon their profession; but my Lords will in future give the instruction given at the Quadrilateral Grammar School herebefore, and arrangements for instruction in practical surveying will also be continued at Portsmouth. My Lords desire, by the establishment of the college, to give to the executive officers of the navy generally every possible advantage in respect of scientific education, but no arrangements will be made at all precluding the all-important practical training in the active duties of their profession." All matters relating to the particular classes of officers admitted to study, and the different subjects of study, are determined by such regulations as may from time to time be laid down by the Admiralty. Special pecuniary concessions are made to officers on half-pay who may enter for study, and officers of the lower grades are put upon full pay, while in all cases there is a Government contribution in aid of expenses. Special professional inducements to study officers, and everything is done to make the college answer thoroughly the purposes for which it was founded. Practical knowledge is taught on the Thames and its estuaries, as theory is taught in the college.
Yard is a very fine establishment. At this victualling yard, as at Deptford and Plymouth, large quantities of biscuit and flour are manufactured. Casks and barrows are also made, but with these exceptions there is no manufacture at Gosport. The depot is supplied with sea provisions and clothing from Deptford, and reissues them to the fleet at Portsmouth. There is an excellent slaughter yard in the place, where cattle delivered under contract are slain, and the meat issued to the fleet.

Gosport Hospital.—This magnificent hospital for the reception of sick and wounded lies at the point seawards, on the Gosport side of the harbour. It is in charge of a resident medical inspector-general, who is assisted by a competent medical and clinical staff.

The second division of naval fortresses, consisting of twenty-six companies, is stationed at Forton barracks, on the Gosport side. Sixteen companies of royal marine artillery have excellent quarters at Eastney, three miles from Portsmouth, opposite St. Helen's, and at Fort Cumberland, a half mile from Eastney.

Plymouth Dockyard.—The naval station of Plymouth is hardly inferior to that of Portsmouth. It possesses one of the finest harbours in the world, capable of containing, in perfect security, at their moorings, not less than a hundred sail of the line, and by means of the breakwater it may boast of an excellent roadstead for eighteen or twenty sail of the line. The old dockyard has only one basin, without gates, but the dimensions are 300 by 280 feet. The excellent harbour of Hamoaze, on the western bank of which the wharfwall extends, almost compensates for the want of other basins, especially as the depth of water allows the largest ships to range along the jetty's, and receive their stores on board immediately from the wharf.

Plymouth dockyard proper extends in a circular sweep along the shores of Hamoaze 3500 feet, its width about the middle, where it is greatest, being 1600, and at each extremity 1000 feet, making its superficial contents about 96 acres. The land front is about 2850 feet. In the line facing the harbour are two dry docks for ships of the first rate, a double dock for seventy-four gun ships, communicating with Hamoaze, and another dock for ships of the line, opening into the basin. There is, besides, a graving-dock without gates, and a canal or camber similar to that in Portsmouth yard, for the admission of vessels bringing stores into the yard, which, communicating with the boat-pond, cuts the dock-yard nearly into two parts. There are five jetty's projecting from the entrances of the dry docks into Hamoaze, alongside of which ships are conveniently brought when undocked. All these are situated between the centre and the northern extremity of the harbour line. On the southern part are three building slips for the largest class of ships and two for smaller vessels, the outer mast-pond. On the upper basins, timber-berths, saw-pits, and smithy. Higher up, on this end of the yard is an extensive mast-pond and mast-locks, with planked houses over them, and, above these, three hemp magazines, contiguous to which is the finest ropery in the kingdom, consisting of two ranges of buildings, one the laying-house, the other the spinning-house, each being 1200 feet in length, and three stores in height. In the construction of the new rope-house no wood has been used excepting the shingles of the roof, to which the slates are fastened. All the rest is of iron. The ribs and girders of the buildings are of cast iron. Embossed over with Yorkshire paving stone, and the doors, window frames, and staircases are all of cast iron, so that the whole building may be considered as proof against fire.

The northern half of the yard, besides the docks and basins, with all the appropriate working sheds and artificers' shops, contains a cluster of very elegant stone buildings, ranged round a quadrangle, the longest sides being about 450 feet, and the shortest 300 feet. Within the quadrangle are also two new ranges of buildings, in which iron has been used in the place of wood. These buildings consist of magazines for different kinds of stores, rigging-houses, and sail-lofts. The northern and upper part of the yard is occupied by a range of handsome houses, with good gardens behind them, for the admiral-superintendent and the principal officers of the yard, the chapel, the guard-house, and pay-officer, stables for the officers and the teams, and a fine reservoir of fresh water for the supply of the yard.

Plymouth is not only a good building and repairing yard, on account of its excellent docks and slips, and the great length of line along the Hamoaze, but also a good refitting yard.

A large addition has been made to Plymouth yard by the fine establishment of Keyham steam factory which adjoins it, with a water frontage of about 1300 feet, with two steam basins—one 630 feet by 500 feet, and another 700 feet by 400 feet. There are also excellent graving docks leading into these basins, around which are coal sheds, storehouses, boat berths, engineers' shops, boiler factories, and all the necessary appliances of mast shears, cranes, and capstans worked by hydraulic or steam machinery. There is no railway within the yard connecting it with the general system of railroad, though means are being taken to secure a junction with the narrow gauge line through Okehampton. Traction engines, called "camels," at present discharge most of the work of a railway.

The number of men borne in Plymouth yard in 1877 is 4336, costing £293,505.

Plymouth Victualling Establishment.—The Royal William Victualling Yard stands on the eastern entrance to Hamoaze, on about 11 acres of ground,—adjoining 4 acres on its south side, on which stand two small forts, and a reservoir containing about 8000 tons of water, which supplies the fleet,—the water being brought from Dartmoor.

Plymouth Hospital is a handsome building of stone, or rather a series of separate buildings, regularly arranged, in which respect, as admitting a freer circulation of air, it is perhaps superior to that of Haslar.

The third division of royal marines, consisting of thirty companies, is stationed at Plymouth. The barracks, situated at Stonehouse, are very airy and spacious.

Pembroke Dockyard.—This dockyard was established in 1814, and is now used merely as a building-yard. It is situated on the southern shore of Milford Haven, not two miles from the town of Pembroke. It includes an area of about 60 acres, its surface descending in a gradual slope to the water's edge, along the shore of which there is a frontage of about 3300 feet. It has a dock, and 14 building slips, 6 of which are for first-class vessels. The largest wooden slip of the royal navy, the "Duke of Wellington," 131 guns, was launched from this yard. Here, too, were built the "Thunderer" and the "Fury," the huge mastsless iron-clad, intended with the "Devastation" and the "Stauncheas" to form the sea police of the coast.

Other Yards.—In addition to the foregoing, there are several small naval yards—at Haulbowline in the Cove of Cork, at Gibraltar, Malta, Antigua, Halifax, Bermuda, Kingston (Jamaica), Cape of Good Hope, Trincomalee, and Hong Kong.

Dockyard Officers.—The management of the dockyards is intrusted to a superintendent, either a rear-admiral or captain; a master attendant and his assistant, a chief constructor and assistant; a store-keeper; an accountant, who is also store-receiver, and a director of police.
DOCKYARDS

RESERVES IN DOCKYARDS.—At each of the ports where there is a dockyard, Penbrook excepted, a certain number of ships when put out of commission, or new ships not commissioned, are laid up in reserve, being classed in one of the four classes, according to the state in which they are when paid off, or the state of forwardness for further service to which they may be ordered by the Admiralty. The reserves used to be comprehended in what was called "the ordinary." But since twenty years the reserve ships have been placed under a captain of the navy, the flag captain of the dockyard admiral. The captain of the reserve is responsible for the care of ship and engines, and also for the due preservation and readiness for immediate service of all the ship's stores and equipment. The latter, excepting very heavy gear, which is kept on board, are kept in special storehouses at the dockyard, where all the items of the ship's "establishment," from cordage to hammocks and lanterns, are kept ready for immediate shipment. These arrangements apply to the ships in the first division of the reserve. Competent technical officers, all the ship's artificers in port not otherwise employed, and a large body of seamen are under the orders of the captain of the reserve.

HISTORY OF MANAGEMENT OF DOCKYARDS.—When Henry VIII. first established a regular king's dockyard at Woolwich, he appointed a board, consisting of certain commissioners for the management of all naval matters; and it is curious enough (see the Pepysian Collection of Manuscripts in the university of Cambridge), that the regulations which he made for the civil government of the navy, and which were in the reign of Edward VI. revised, arranged, and turned into ordinances, form the broad basis of all the subsequent instructions given to the several officers to whom the management of the civil affairs of the navy has been committed. The commissioners of the navy then consisted of the vice-admiral of England, the master of the ordnance, the surveyor of the marine affairs, the treasurer, comptroller, general surveyor of the victualling, clerk of the ships, and clerk of the stores. They had each their particular duties; and once a week they were ordered to meet at their office on Tower Hill, and once a month report their proceedings to the lord high admiral.

In 1609 the principal officers for conducting the civil affairs of the navy were suspended, in consequence of many abuses being complained of; and other commissioners were appointed, with powers to manage, settle, and put the affairs of the navy into a proper train, and to prevent, by such measures as might appear to be necessary, the continuance of the many great frauds and abuses which had prevailed. A similar commission was renewed in 1618, which in a full and minute report detailed and explained those frauds and abuses. That commission, which ended on the death of James I., was renewed by his successor, and remained in force till 1628, when it was dissolved, and the management of the reserves restored to the board of officers established by Edward VI.

In the disturbed reign of Charles I. the navy was suffered to go to decay, but by the extraordinary exertions of Cromwell it was raised to a height which it had never before reached; it again declined, however, under the administration of his son. At the Restoration, the duke of York, of whom Macaulay wrote that he was the only honest man in his dockyards, was appointed lord high admiral; and by his advice a committee was appointed to consider a plan he had drawn out for the future regulation of the affairs of the navy, at which he himself presided. "In all naval affairs," says the commissioners of revision, "he appears to have acted with the advice and assistance of Sir Samuel Pepys, who first held the office of clerk of the acts, and was afterwards secretary of the Admiralty,—a man of extraordinary knowledge in all that related to the business of that department, of great talents, and the most indefatigable industry."

The entire management of the navy was now in the hands of the duke, as lord high admiral, by whom three new commissioners were appointed to act with the treasurer of the navy, the comptroller, the surveyor, and clerk of the acts, as principal officers and commissioners of the navy. A book of instructions, drawn out by Pepys, was sent to the navy board for its guidance. A rapid progress was made in the repair and augmentation of the fleet; but the duke being called away, in consequence of the Dutch war in 1664, the example of zeal and industry set by Pepys was not sufficient, in the duke's absence, to prevent neglect and mismanagement in every department, except his own.

From 1673 to 1679, the office of lord high admiral was put in commission, while Pepys sat at the head of it. The king, through Pepys, arranged all naval affairs; but in the latter year, when the duke was sent abroad, and Pepys to the Tower, a new set of men were made commissioners of the navy, who, without experience, ability, or industry, suffered the navy to go to decay. "All the wise regulations," say the commissioners of revision, "formed during the administration of the duke of York, were neglected; and such supineness and waste appear to have prevailed as, at the end of not more than five years, when he was recalled to the office of lord high admiral, only twenty-two ships, none larger than a fourth-rate, with two fireships, were at sea; those in the harbour were quite unfit for service; even the thirty new ships which he had left building had been suffered to fall into a state of great decay, and hardly any stores were found to remain in the dock-yards." Pepys was re-appointed secretary of the Admiralty; the king instituted an inquiry into the characters and abilities of the first ship-builders in England, and by the advice of Pepys added Sir Anthony Dean, eminent in that profession, with three others, to the former principal officers. The old commissioners were directed entirely to confine their attention to the business of a committee of accounts. To each of the new commissioners was intrusted a distinct branch of the proposed reform; and it appears that, highly to their credit, "they performed what they had undertaken in less time than was allowed for it, and at less expense," having completed their business to the general satisfaction of the public two months before the Revolution. The business of the navy, thus methodized and settled, remained undisturbed by that event.

It will readily be seen that the vast increase of our naval force since that time has necessarily required many additional orders and regulations, some of which, from circumstances, were not compatible with each other; some were given to one dockyard and not to another; others in one yard became obsolete, while their continuance was acted upon in another; so that there was no longer that uniformity in the management which it is desirable—indeed, essentially necessary—to preserve. From the year 1764 to 1804, when the king appointed a commission "for revising and digesting the civil affairs of his navy," the attention of the lords of the admiralty and the navy board had frequently been directed to this important subject; but nothing was done to forward so desirable an arrangement, except that Sir Charles Middleton (afterwards Lord Earham), when comptroller of the navy, classed and digested under distinct heads all orders and regulations prior to the year 1786. The commissioners of naval inquiry, appointed in 1803, state the necessity of revising the instructions, and digesting the immense mass of orders
issued to the dockyard officers, and regret that a work of such utility should not have been completed. The commission consisted of Admiral Lord Barham, John Fordyce, Esq., Admiral Sir Roger Curtis, Bart., Vice-Admiral Donnelt, and Ambrose Stirling, Esq. They made fifteen distinct reports, the date of the first being 13th June 1805, of the last the 6th March 1806. All these except two were printed by order of the House of Commons, and were mostly carried into effect by Orders in Council. One of the two not printed is an inquiry into the state of the navy at different periods, and of naval timber; the other relates to the formation of a new dock-yard at Northfleet.

These reports led to the establishment, for the first time, in all dockyards, of one uniform system of management, by which it was hoped uncalculable advantages would have been secured, in the preventing of frauds, in the saving of labour and materials, and consequently time and expense, and in securing better workmanship in the construction of ships, but the system was cumbrous and expensive, and has given way to other more judicious management.

The management of the dockyards, and of all the civil affairs of the navy, was formerly intrusted to certain commissioners, of whom the comptroller of the navy, the surveyor of the navy, the controller of victualling and transports, the director of transports in 1869 this arrangement was modified, and the work of the comptroller of victualling and transports, the director of the survey, and master measurer were abolished, and a store-receiver was substituted for the timber-master. Many subordinate offices were abolished, and the whole system of working the men and keeping the accounts was simplified and amended. Some idea may be formed of the immense expense by the simple fact that, while in the ordinary estimate of the navy for 1817 the establishment of officers in Portsmouth yard was £50,065, in 1833 it was only £19,803, and in 1853, £20,121. To this last, however, must be added the salaries of officers employed in the steam factory, which amounted to £3,555.

The principal officers in the factory are—1, the chief engineer and inspector of machinery; 2, his assistant; 3, assistant inspector of machinery; 4, foreman of the factory; 5, foreman of boilmakers; 6, pay-clerk and book-keeper.

At one time the men in the dockyards were employed almost wholly on job and task-work. Between 1850 and the present time they have been almost wholly on a day pay smaller than that given in the general trade, but having a title to a pension, contingently upon good service and good behaviour, attached to it. In 1869 Mr Childers cut down to a considerable extent the "establishment" system of dockyardmen, replaced the vacancies with hired men on higher pay, but without a title to pension, and with the usual liability to discharge at a week's notice when work is slack. The salary system, with its concomitant vested interests, was not found to be productive of quick and therefore of economical work. Mr Childers's alteration improved matters not a little, but job and task-work, besides being more in accordance with the usages of the day, is far more likely to interest and stimulate the men. One great advantage, however, of the salary system is the discouragement it gives to strikes. The conditions under which alone pensions are earned act as deterrents.

In ordinary years the number of workmen of all kinds required for the service of the dockyards is, in round numbers, 16,000.

Defence of the yards.—In the year 1847 the workmen of the several dockyards were enrolled into a corps for the defence of the yards, and certain numbers were trained to the use of the great gun exercise, so that each of the dockyard battalions had some artillery attached to them. In 1854 the corps fell into disuse, was not found to be productive of quick and therefore of economical work. Mr Childers's alteration improved matters not a little, but job and task-work, besides being more in accordance with the usages of the day, is far more likely to interest and stimulate the men. One great advantage, however, of the salary system is the discouragement it gives to strikes. The conditions under which alone pensions are earned act as deterrents.

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In ordinary years the number of workmen of all kinds required for the service of the dockyards is, in round numbers, 16,000.
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<tr>
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<td>653</td>
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Doctor, denoting etymologically a teacher, is the title conferred by the highest university degree. Originally there were only two steps in graduation, those of bachelor and master, and the title doctor was given to certain masters as an alternative or as a merely honorary appellation. It is in this sense that the word is to be understood in the phrase Doctor Angelicus applied to Aquinas, and in many other familiar instances of a similar kind. The process by which the doctorate became established as a third degree, distinct from and superior to that of master, cannot be very clearly traced. At Bologna it seems to have been conferred in the faculty of law as early as the 12th century, but there is no sufficient authority for the statement commonly made that the celebrated Inererus drew up the formulary for the ceremonial, and that Bulgurus was the first who took the degree. Paris, the other great university of the Middle Ages, conferred the degree in the faculty of divinity, according to Antony Wood, some time after 1150, the earliest recipients being Peter Lombard and Gilbert de la Portree. In England the degree was introduced in the reign of John or of Henry III. Both in England and on the Continent it was confined for a considerable period to the faculties of law and divinity; it was not until the 14th century that it began to be conferred in medicine, and in England it is still unknown in the faculty of arts. In Germany, however, there is a degree of doctor of philosophy. The doctorate of music was first conferred at Oxford and Cambridge, its use in Germany is comparatively recent. See Universities.

Doctors' Commons was a society of ecclesiastical lawyers in London, forming a distinct profession for the practice of the civil and canon laws. Some members of the profession purchased in 1567 a site near St Paul's, on which at their own expense they erected houses for the residence of the judges and advocates, and proper buildings for holding the ecclesiastical and admiralty courts. In the year 1768 a royal charter was obtained by virtue of which the then members of the society and their successors were incorporated under the name and title of 'The College of Doctors of Law exercent in the Ecclesiastical and Admiralty Courts.' The college consists of a president (the dean of Arches for the time being) and of those doctors of law who, having regularly taken that degree in either of the universities of Oxford or Cambridge, and having been admitted advocates in pursuance of the recipt of the archbishop of Canterbury, shall have been elected fellow in the manner prescribed by the charter. The judges of the archepiscopal courts were always selected from this college. By 20 and 21 Vict. c. 77 (the Act to amend the law relating to Probate and Letters of Administration) §§ 116 and 117, the college is empowered to sell its real and personal estate and to surrender its charter to Her Majesty, and it is enacted that on such surrender the college shall be dissolved and the property thereof shall belong to the then existing members as tenants in common for their own use and benefit. In pursuance of this enactment the college has been dissolved and the ecclesiastical courts are now open to the whole bar.

Doctor is the name applied by its opponents to a small but very influential political party in France which made itself prominent after the restoration of the Bourbons in 1815. The doctrine of fundamental principle on which its action was based was that the sole justification of any form of government was the manner in which exercised power. Rejecting the claim of divine right, whether urged for monarchy or for republicanism, the doctrinaires were opposed alike to the ultra-royalists and to the revolutionists. In the chamber they occupied the left centre, and thus marked themselves out from the centre or ministerialist and the left or opposition party. While maintaining the re-established dynasty their efforts were mainly directed towards moulding the constitution into a shape resembling as nearly as possible that of England. The leaders of the doctrinaires were Royer-Collard, the Duc de Broglie, and Guizot. After the revolution of 1830 several of them came into power and proved strong supporters of constitutional monarchy on the model that has existed in England since the reign of William. The name doctrinaires fell entirely out of use after 1845, but the principles of the party have been faithfully represented since that date by the Orléansists. See France.

Dodd, Dr William (1759-1777), an unfortunate English divine, eldest son of the Rev William Dodd, many years vicar of Bourne, in Lincolnshire was born there in May 1729. He was sent, at the age of sixteen, to the university of Cambridge, where he was admitted a sizar of Clare Hall in 1743. He took the degree of B.A. in 1750, being in the list of wranglers. On leaving the university, he married a young woman of the name of Perkins, the daughter of a veger. She had a more than questionable reputation, and her extravagant habits contributed in no small degree to her husband's disgrace and ruin. In 1751 he was ordained deacon, and in 1753 priest, and he soon became a popular and celebrated preacher. His first preferment was the lectureship of West-Hamp and Bow. In 1754 he was also chosen lecturer of St Olave's, Hart Street, and in 1757 he took the degree of M.A. at Cambridge. He was a strenuous supporter of the Magdalen Hospital, which was founded in 1755, and soon afterwards became preacher at the chapel of that charity. In 1763 he obtained a prebend at Breen, and in the same year he was appointed one of the King's chaplains,—soon after which the education of Philip Stanhope, afterwards earl of Chesterfield, was committed to his care. In 1768 he went to Cambridge, and took the degree of L.L.D. At this period he was held in high estimation; but eager for further advancement, he unhappily entered on courses which in the end proved the occasion of his ruin. On the living of St George's, Hanover Square, becoming vacant, he wrote an anonymous letter to the wife of the lord chancellor offering three thousand pounds for the same if, by her assistance, he was promoted to the benefice. This letter having been traced to him, a complaint was immediately made to the king, and he was dismissed with disgrace from his office of chaplain. After residing for some time at Geneva and Paris, he returned to England in 1775. He still continued to exercise his clerical functions, but his extravagant mode of life soon involved him in difficulties. To meet the demands of his creditors he forged a bond on his former pupil Lord Chesterfield for £4200, and actually received the money. But he was detected, committed to prison, tried at the Old Bailey, found guilty, and sentenced to death; and, in spite of numerous applications for mercy, he was executed at Tyburn on the 27th June 1777. Dr Samuel Johnson was very zealous in pleading for a pardon, and a petition from the rest of London received 33,000 signatures. Dr Dodd was a voluminous writer, and possessed considerable abilities, with but little judgment and much vanity. His Beauties of Shakespeare, published before he entered the church, was long a well known work; and his Thoughts in Prison, a poem in blank verse, written during the interval between his conviction and his execution, naturally attracted much attention. He published a large number of sermons and other theological works. An accurate list of his various writings is prefixed to his Thoughts in Prison.
epiphytic plants forming the genus 
Cuscuta and natural order 
Cuscutales or, according to some botanists, the tribe 
Cuscuteraceae. All the species are natives of 
temperate regions, and all have strong acrid properties.

The flowers, which grow in clusters, have a quinque-partite, coloured calyx; scales alternating with the corolline lobes; carpels forming a syncarpous ovary; the albumen of the seeds finely divided, so that there exist no spirals, filaments, and aculeatedoones. On coming in contact with the living stem of some other plant the seedling dodder throws out a sucker, by which it attaches itself and commences to absorb the sap of its foster-parent; it then soon ceases to have any connection with the ground. As it grows, it throws out fresh suckers, establishing itself firmly on its victim. After making a few turns round one stem the dodder finds its way to another, and thus it continues twining and branching till it resembles "fine, closely-tangled, wet outgrow." The injury done to flax, clover, hop, and bean crops by species of dodder is often very great. C. europaeus, the Greater Dodder, is found parasitic on nettles, thistles, vetches, and the hop; C. Epipilum, on flax, C. Epipilum, on flax, 

DODDIDGE, Perkin (1702-1751), a celebrated nonconformist divine, was born 1702. His father, Daniel Doddridge, was a London merchant, and his mother the orphan daughter of the Rev. John Bauman, a Bohemian clergyman who had fled to England to escape religious persecution, and who had been for some time the master of the grammar school at Kingston-upon-Thames. He was the youngest of a family of twenty, of whom there was at his birth only one other child, a daughter, surviving. It is also remarkable that he himself at his birth was put aside as actually dead, and was only preserved alive owing to the accidental glance of one of the attendants, who fancied she perceived a feeble heaving of the infant's chest, and was successful in rekindling the almost extinguished vital spark. Before he could read, his mother taught him the history of the Old and New Testament by the assistance of some blue Dutch tiles; and these stories, he says, were the means of enforcing such good impressions on his heart as never afterwards the out. He was, indeed, so early to leave the paternal roof he was placed under the tuition of the Rev. Mr. Scott, who taught a private school in London, and on attaining his tenth year he was sent to the grammar school at Kingston-upon-Thames. About 1715 he was removed to a private school at St Albans, where he began to keep an exact account of his time in order the better to improve himself by private meditation and study, and was in the habit during his walks of entering the neighbouring cottages to read to the inmates a few pages from the Bible or from some religious book. Through the interest of friends a proposal was made to him, in 1719, which would have enabled him to enter the English bar; but receiving at the same time an invitation to study for the ministry, he preferred the latter, and shortly thereafter removed to the academy for dissenters at Kidbrooke in Kent, which at that time by the Rev. John Jennings. Mr. Jennings having in 1723 received an invitation to Hackney, the academy was removed thither; and in 1723 Doddridge, having finished his studies, accepted an invitation to succeed him in the ministry at Kidbrooke. He had also been mentioned by Jennings, who died in 1723, as the person most fitted to extend his views and as an instructor of candidates for the ministry, but it was not till 1739 that he was appointed minister of Newington Green. A short time after his appointment, he was chosen to conduct the academy established in that year at Harborough. In the same year he received an invitation from the congregation at Northampton, which he accepted. Here he continued his ministrations till 1751, when the rapid progress of consumption caused him to seek the advantages of a milder climate. Accordingly he sailed for Lisbon on the 30th September of that year; but the change was unavailing, and he died there on 26th October.

His popularity as a preacher is said to have been chiefly due to his "high susceptibility, joined with physical advantages and perfect sincerity." His sermons were mostly practical in character, and his great aim was to cultivate in his hearers a spiritual and devotional frame of mind. "He endeavoured," he says, "to write on the common general principles of Christianity, and not in the narrow spirit of any particular party." "There is," says his biographer, "a remarkable delicacy and caution evinced in the works of Dr Doddridge whenever the subject approaches the disputed points of theology. The genuine expressions of the sacred writers are then employed, and the reader is allowed to draw his own conclusions, unbiased by the prejudices of human authoritres." Those portions of his theological lectures which treat on the matter alluded to, substantiate this statement. His principal works are The Rise and Progress of Religion in the Soul, The Family Expositor, Life of Colonel Gardiner, and a Course of Metaphysical, Ethical, and Theological Lectures. He also published several courses of sermons on particular topics, and is the author of many well-known hymns.

See Memoirs, by Rev. Job Orton, 1765; Letters to and from Dr Doddridge, by Rev. Thomas Steinman, 1790, and Correspondence and Diary, in 5 vols. by his grandson, John Doddridge Humphreys, 1829.

DÖDERLEIN, JOHANN CHRISTOPH WILHELM LUDWIG (1791-1863), a distinguished German philologist, was born at Jena on the 19th December 1791. His father, Johann Christoph Doderlein, professor of theology at Jena, was celebrated for his varied learning, for his eloquence as a preacher, and for the important influence he exerted in guiding the transition movement from strict orthodoxy to a freer theology. Ludwig Doderlein, after receiving his preliminary education at Windheim and Schulpforta, studied at Mannich, Heidelberg, Erlangen, and Berlin. He devoted his chief attention to philology under the instruction of Creuzer, Vischer, Wolf, Creuzer, and Buttman. In 1815, soon after completing his studies at Berlin, he accepted the appointment of ordinary professor of philology in the academy of Bern. In 1819 he was transferred to Erlangen, where he became second professor of philology in the university and rector of the gymnasium. In 1827 he became first professor of philology and rhetoric and director of the philological seminary. He continued to discharge the duties of both offices until within a short period of his death, which occurred on the 9th November 1863. Doderlein's most valuable work as a philologist was rendered in the department of etymology and lexicography. He is best known by his Lateinische Synonymen und Etymologien (6 vols., Leipzig, 1826-38), and his Homerische Glossarium (3 vols., Erlangen, 1850-59). To the same class belong his Lateinische Wortbildung (Leipsic, 1838), Handbuch der Lateinischen Synonymen (Leipsic, 1858), and the Handbuch der Lateinischen Etymologie (Leipsic, 1841), besides various works of a more elementary kind intended for the use of schools and gymnasium. Most of the works named have been translated into English. To critical philology Doderlein contributed valuable editions of Tacitus (Opera, 1847; Germania, with a German translation) and Horace (Epistola, with a German translation, Leipzig, 1839) and Satire (Leipsic, 1866). His Roman und Aufsatzen (Erlangen, 1843-7) and Oeiffische Reden (1860) consist chiefly of academic addresses dealing with various subjects in pedagogy and philology.
DODO

DODO, from the Portuguese Doudo (a simpleton), a large bird formerly inhabiting the island of Mauritius, but now extinct. The name is derived from the Dutch Dood, which he minutely describes. It was taken for a possible cure of cancer, and the late Dr Gray has suggested its identity with that now in the British Museum, but on what grounds is not apparent.

school of Utrecht, in which is past an original drawing by Van de Venne superscribed "Vera effigies huus avas Walghoogel (zuan & a manitir Dodoos propter sedum posterosa partis crassitum munerem," and this was Amsterdanscum perlat est ex insula Mauritius Anno M.DC.XXVI." Now a good many paintings of the Dodo by a celebrated artist named Roelandt Savery, who was born at Courtray in 1576 and died in 1639, have been known, and have always been more or less mistaken. These were drawn from the life. Proof, however, of the limning of a living Dodo in Holland at that period had hitherto been wanting. There can now be no longer any doubt of the fact; and the paintings by this artist of the Dodo at Berlin and Vienna—dated respectively 1626 and 1628—as well as the picture by Gheeraerts, belonging to the Duke of Northumberland, at Ston House, dated 1627, may be with greater plausibility than ever considered portraits of a captive bird. It is even probable that this was the first example which had sat to a painter in Europe. It would be enough to quote from the Hague, that in the possession of the Zoological Society of London (formerly Broderip's), that in the Schonborn collection at Pommersfelden near Bamberg, and that belonging to Dr Seyffert at Stuttgart are undated, but were probably all painted about the same time (viz. 1626 to 1628) The large picture in the British Museum, once belonging to Sir Hans Sloane, by an unknown artist, but supposed to be by Roelandt Savery, is also undated, while the still larger one at Oxford (considered to be by the younger Savery) bears a much later date, 1651. Undated also is a picture said to be by Pieter Holsteyn, and in the possession of Dr A. van der Willige at Haarlem in Holland.

In 1628 we have the evidence of the first English observer of the bird—eunuch Altham, who mentions in two letters written on the same day from Mauritius to his brother at home These have only of late, through the intervention of Dr Wilmot, been brought to light. They run thus, though several times mentioning the bird, fail to supply any important fact in its history. Their navigators, however, were not idle, and found work for their naturalists and painters. Clusius says that in 1605 he saw at Fauw's House in Leyden a Dodo's foot, which he minutely describes. Of late years a copy of Clusius's work has been discovered in the high

1 Alteny and Coldl, in their Woordenboek der twee Twaen Portugeesch en Nederland ert (Amsterdam, 1714, p. 369), read as "En vol. duas, lol. du, sinistra manch."
2 It is from one of these that the figures of the large extinct Parrot (Lophopterus macrurus), before given [Birds, vol. iii. p. 355] were taken. Prof. Schlegel has announced his intention of immediately publishing these sketches in fac-simile.
3 The etymology of these names has been much discussed. That of the latter, which has generally been adopted by German and French authors, seems to defy investigation, but the former has been shown by Prof. Schlegel (Verol in Medebel K. Akad Wetensc.h npp 355 et seq.) to be the homely name of the Dabach or Little Grebe (Podicipus minor), of which the Dutchmen were reminded by the round stern and tail drawn to a tuft that characterized the Dodo. The same learned authority suggests that Dodo is a corruption of Dodorus, but, as will presently be seen, we hereon think him mistaken.
4 Van de Venne's incised name is it, and has reference to its simplesness, a Bird which for shape and rarity might be called a Phoenix (wien in Arabia) —the rest of the passage is entertaining, but the whole has been often reprinted. Herbert, it may be remarked, when he comes to possible cure similarly.
was weak as an etymologist, but his positive statement, corroborated as it is by Altham, cannot be set aside, and he was not unprepared to assign a Portuguese derivation for the word. 1 Herbert also gave a figure of the bird.

Proceeding chronologically we next come upon a curious bit of evidence. This is contained in a MS. diary kept between 1626 and 1640 by Thomas Crossfield of Queen's College, Oxford, where, under the year 1636, mention is casually made of one Mr. Goasing "who bestowed the Dodar (a blacke Indian bird) vnpon ye Anatomy school." Nothing more is known of it. About 1638, Sir Hamon Lestrange tells us, as he walked London streets he saw the picture of a strange fowl hung out on a cloth canvas, and going in to see it found a great bird kept in a chamber "somewhat bigger than the largest Turkycock, and so legged and footed, but shorter and thicker." The keeper called it a Dodo and showed the visitors how its captive would swallow "large poble stones . . . . as bigge as nutmegges."

In 1651 Morris published an account of a voyage made by Francois Cauche, who proved to have been an admirable and correct writer. The narrative is not very trustworthy, and indeed certain statements are obviously inaccurate. Cauche says he saw there birds bigger than Swans, which he describes so as to leave no doubt of his meaning Dodos; but perhaps the most important fact (if they be facts) that he relates is that they had a cry like a Goasing ("il un crye comme l'osouer"), and that they laid a single white egg, "gros comme un pain d'un sol," on a mass of grass in the forests. He calls them "oiseux de Nazarel," perhaps, as a marginal note informs us, from an island of that name which was then supposed to lie more to the northward, but is now known to have no existence.

In the catalogue of Tradescant's Collection of Rarities, preserved at South Lambeth, published in 1656, we have entered among the "Whole Birds" a "Dadar from the island Mauritius," it is not able to fly but being so big. This specimen may well have been the skin of the bird seen by Lestrange some eighteen years before, but anyhow we are able to trace the specimen through Willughby, Llwyd, and Hyde, till it passed in or before 1684 to the Ashmolean collection at Oxford. In 1755 it was ordered to be destroyed, but, in accordance with the original orders of Ashmole, its head and right foot were preserved, and are now in the Museum of that University. In the second edition of a Catalogue of many Natural Rarities, &c., to be seen at the place formerly called the Musco House, near the West End of St. Paul's Church, collected by one Hubert alias Forbes, and published in 1665, mention is made of a "egg of a Dodo, a great heavy bird that cannot fly; it is a Bird of the Mauritius Island." This is supposed to have subsequently passed into the possession of the Royal Society. At all events such a specimen is included in Grew's list of their treasures which was published in 1681. This was afterwards transferred to the British Museum, where it still remains. As may be supposed, without the integuments, but it differs sufficiently in size from the Oxford specimen to forbid its having been part of the same individual. In 1666 Olearius brought out the Gortissches Kunst Kämmer, wherein he describes the head of a Waldhoog, which some sixty years later was removed to the Museum at Copenhagen, and is now preserved there.

1 Hence we venture to dispute Prof. Schlegel's supposed origin of "Dodo." The Portuguese must have been the prior nomenclators, and if, as is most likely, some of their nation, or men acquainted with their language, were employed to pilot the Hollanders, we see at once how the first Dutch name Waldhoog would give way. The word standing for Dodo not being plain to the Dutch, they would, as is the habit of sailors, convert it into something they did understand. Then Doodara would easily suggest itself.

having been the means of first leading zoologists, under the guidance of Prof. Reinhart, to recognize the true affinities of the bird.

Little more remains to be told. For brevity's sake we have passed over all but the principal narratives of voyagers or other notices of the bird. A copious bibliography, up to the year 1648, will be found in Strickland's hook work, 2 and the last was continued by Von Frauenfeld 3 for twenty years later. The last evidence we have of the Dodos existence is furnished by a journal kept by Benj. Harry, and now in the British Museum (Miss. Addit. 3066. 11. D). This shows its survival till 1681, but the writer's sole remark upon it is that its "shelah is very hard." The successive occupation of the island by different masters seems to have destroyed every tradition relating to the bird, and doubts began to arise whether such a creature had ever existed. Duncan, in 1628, showed how ill-founded these doubts were, and some ten years later Broderip with much diligence collected all the available evidence, which in its turn was succeeded by Strickland's monograph just mentioned. But in the meanwhile little was done towards obtaining any material advance in our knowledge, Prof. Reinhart's determination of its affinity to the Pigeons (Columbae) excepted; and it was hardly until Clark's discovery in 1659 (Birds, vol. ii. p. 729) of a large number of Dodos remains, that zoologists generally were prepared to accept that affinity without question. The examination of bone after bone by Prof. Owen and others confirmed the judgment of the Danish naturalist, and there is now no possibility of any different view being successfully maintained.

The causes which led to the extinction of this ponderous Pigeon have been discussed in a former article, and nothing new can be added on that branch of the subject; but it will be remembered that the Dodo does not stand alone in its fate, and that two more or less nearly allied birds inhabiting the outer islands of Reunion and Rodrigues have in like manner disappeared from the face of the earth.

(A. N.)

DODONA, in Epirus, was the seat of the most ancient and venerable of all Hellene sanctuaries. In the plains of the Dodonae, and on the banks of the neighbouring Achelous, there dwelt in times long anterior to history the race of Heili or Hellenes, who thence spread into Thessaly and Greece. In after years the Greek tyrants, both of Athens and the Great King of Persia, set up statues on the inhabitants of Epirus as barbarians; nevertheless for Dodonae they always preserved a certain reverence, and the temple there was the object of frequent missions from them. This temple was dedicated to the Pelasgic Zeus, the wielder of the thunderbolt in the storms so frequent in Epirus. Connected with the temple was an oracle which enjoyed more reputation in Greece than any other save that at Delphi, and which would seem to date from more early times than the worship of Zeus, for the normal method of gathering the responses of the oracle was by listening to the rustling of an old oak tree, which was supposed to be the seat of the deity, and by taking these as an augury of the future. We seem here to have a remnant of the very ancient and widely diffused tree-worship. Sometimes, however, auguries were taken in other manners, being drawn from the meaning of doves in the branches, the murmur of a fountain which rose close by, or the resounding of the wind in the brazen tripod which formed a circle all round the temple. The oracle was then compared with the articulate responses of Delphi, dumb, but none the less constantly consulted. Caesar proposed

DOD—DOD

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establisli himself as bookseller in Pall Mall, and his
ment and enterprising spirit soon made him one of the
foremost publishers of the day. One of the first copyrights
he published was that of Johnson's London, for which
he gave ten guineas in 1758, and he was afterwards the
leader of the association of booksellers that furnished Johnson
with funds for the preparation of his English Dictionary.
In 1737 a new piece of his own, entitled The King and the
Miller of Mansfield, was received with undiminished
applause. His immediately subsequent fates, however,
were not so popular. In 1738 he published a collection
of his dramatic works in one volume 8vo, under
the modest title of Trites, which was followed by the
Triumph of Peace, a masque, occasioned by the treaty of
Arras-Chapel, and a fragment on Public Virtue. Dodd
was also the author of the Economy of Human Life, a work
which acquired considerable celebrity, but for this it is
supposed he was not a little indebted to the mistaken
opinion which long prevailed that it was the production of
Lord Chesterfield. The name of Dodley is from this
time associated with much of the literature of his time.
Among other things he projected The Animal Register,
commenced in 1738, The Museum, The World, and The
Preceptor. To these various works Horace Walpole,
Aekensale, Soame Jenys, Lord Lyttelton, Lord Chesterfield,
Edmund Burke, and others were contributors. His own
latest production was a tragedy entitled Cleone, which was
received with even greater enthusiasm than his earlier
works. It had a long run at Covent Garden, two
thousand copies of it were sold on the day of publication,
and it passed through four editions within the year.
It has long, however, ceased to be read, and apart from his
fame as a publisher Dodley is now chiefly remembered on
account of his Select Collections of Old Plays ( 12 vols.
He died at Dulwich while on a visit to a friend, 25th
September, 1764.

DODWELL, EDWARD (1767–1832), an English
tiquarian writer and draughtsman of considerable note in
the department of classical investigation. He belonged to
the same family as Henry Dodwell the theologian,
and received his education at Cambridge. Being under no
necessity to adapt himself to be a professional man of livelihood, he
devoted himself entirely to his favourite pursuits, travelled
for several years—from 1801 to 1806—in Greece, and spent
the rest of his life for the most part in Italy, either at
Naples or at Rome. An illness contracted in 1850 during
a visit of exploration to the Sabine Mountains, undermined
his constitution and ultimately resulted in his death,
which took place at Rome in May 1832. His widow, a
daugther of Count Giraud, was thirty years his junior, and after his
death became famous as the "beautiful" countess of Svarou,
and played a considerable role in the political life of the
Papal city.

His works are—A Classical and Topographical Tour through
Greece, 2 vols, London, 1819, of which a German translation
by Sichler was published at Hennepin in 1821, France en Greece, con-
sisting of thirty coloured plates, London, 1821, and Views and
Descriptions of Cyclopian and Pelasgian Ruins in Italy and Greece,
London, 1834. The last work, which contains 120 plates, was
brought out simultaneously at Paris with a French text.

DODWELL, HENRY (1641–1711), a learned controver-
sional writer, was born at Dublin in October 1641. His
father had once been possessed of considerable property
in Connaught, but having lost it at the rebellion settled at
York in 1648. Here Henry received his preliminary edu-
cation at the free school. By the death of his parents
he was reduced in early life to the greatest poverty.
In 1651 he was sent by his uncle to Trinity College,
Dublin, of which he was soon afterwards chosen schol-
ar and fellow. Having conscientious objections to take

the stormy shades of Sulli who sleep on the ground and wash
not their feet, and on the second occasion describing a
vast of Odysseus to the oracle. Herodot has left us a com-
plete description of the Dodona or Hellen, which he
calls a district full of cowfields, of hords and flocks and of
sheepfolds, where is built on an extremity ( νεανική) Daulons,
where Zeus dwells in the stem of an oak (άργυρος).
Herodotus tells a story which he learned at Egyptian
Thebes, that the oracle of Dodona was founded by an
Egyptian priestess who was carried away by the Phenicians,
but says that the local legend substitutes for this priestess
a black dove, a substitution in which he treated us a
rational meaning. From later writers we learn that in
historical times there was worshipped, together with Zeus,
an Asiatic goddess under the name Dione, and therefor
the responses were given by the priestesses of the
latter, who were called doves, and not by the Sulli.

As to the site of Dodona there has been a good deal of
discussion. We know from the authorities that the town
was situated in a fertile vale at the foot of the mountain
Tomaros, whence issued a multitude of springs, and that it
was on the eastern boundary of Epirus, and on the confines
of Thessalia and Molossia. We are further told that
Dodona was a two days' journey from Ambracia, and a
journey of four days from buttolotum. It would also
appear certain that it was in a region of frequent thunder-
storms. In accordance with these indications, Colonel
Leake fixed on Castria near Janina in Epirus, at the foot
of the mountain Mitakith, as the site of Dodona. But his
reasons are not conclusive. Quite recently excavations
have been undertaken at a spot in the valley of Drynnasus,
a few leagues south of Castria, at the foot of Mount
Olympos, where Leake found the remains of a theatre and
of two temples. This has usually been supposed to be the
site of Passaron, the ancient capital of the Molossian kings.
But these excavations have brought to light not only many
antiquities, but tablets ofvote bearing dedicatory inscrip-
tions to Zeus Nanos and Dione, and many fragments of
tripods, of which it would seem highly probable that
the opinion of Leake must be given up, and the new site
definitely fixed upon as that of Dodona. (See Leake,
Northern Greece, vols. 1, 2, Revue Archologicque for 1817,
p 329, 397.)

The temple of Dodona was destroyed by the Eotolans in
219 B.C., but the oracle survived to the times of
Pausanias and even of the emperor Julian.

DODSLEY, ROUSSE (1703–1761), an eminent book-
seller and versatile writer, born in 1703 at Mansfield,
Nottinghamshire, where his father is said to have been
a schoolmaster. In his youth he was apprenticed to a
stocking weaver, from whom he ran away, taking service
as a footman. His first poetical attempts seem to have
been made when he was a servant in the family of the Hon.
Mrs Lovelier, and were published by subscription under
the title of The Man in Lottery, or The Footman's Miscellany
(1730). This was followed by an elegant little satire
now called The Top-hap, the hint of which is said to have
been taken from Randolph's Moon's Vntook-glass, and which,
 having obtained the approbation of Pope, was acted
at Covent Garden with great success. The profits accruing
from the sale of these two publications enabled him to
orders he relinquished his fellowship in 1668, and resided for some time at Oxford, Dublin, and London successively. In 1671, he was elected Camden professor of history at Oxford, and in 1691 he was deprived of his professorship for refusing to take the oaths of allegiance to William and Mary. Returning to Shottesbrooke in Berkshire, and living on the produce of a small estate in Ireland, which he had at first generously relinquished in favour of a near relation, he devoted himself to those literary labours in chronology and ecclesiastical polity on which his fame now rests. In the former department he published—Discourse on the Phenician History of Sanchoniathon (1651); Annals Thucydides et Xenophonis (1696); Chronologia Graeco-Romana pro Hypothetis Dion. Italicamassii (1692); Annales Valoisiani, Quintiliani, Statiacii (1698); and a larger treatise entitled De Veteribus Graecorum Romanorum-anque Ciculis, obsterre de Cyclo Judaorum ac Erate Christi, Dissertationes (1701). All these obtained considerable reputation, and were frequently reprinted. Gibbon speaks of his learning as "the most singular, and must be his "skill in employing facts is equal to his learning." In the department of ecclesiastical polity his works are more numerous and of much less value, his judgment being far inferior to his power of research. In his earlier writings he was regarded as one of the greatest champions of the non-jurors; but the absurd doctrine which he afterwards pronounced, that immortality could be enjoyed only by those who had received baptism from the hands of one set of regularly ordained clergy, and was therefore a privilege from which dissenters were hopelessly excluded, justly deprived him of the confidence even of his friends. It is interesting, however, in view of the recent revival of the same doctrine, to know that he published in 1706 a treatise professing to prove from Scripture and the first fathers that the soul is naturally mortal. Dodwell died at Shottesbrooke, 7th June 1711. His eldest son Henry was known as the author of a pamphlet entitled Christianity not founded on Argument, to which a reply was published by his brother William, who was besides engaged in a controversy with Dr Conyers Middleton on the subject of miracles.

DOG, a name common to several species of Canis—a family of Carnivorous Mammals widely distributed over nearly every part of the globe. Many of them belonging to this family, as the wolf and the jackal, are social animals, hunting in packs, and are readily tamed; while in confinement they show little or no repugnance to breeding. In a group thus eminently capable of domestication, it is not surprising that in the earliest times one or more species should have been brought under the dominion of man, or that under human care the domestic dog should have become, as Baron Cuvier calls it, "the completest, the most singular, and the most useful conquest ever made by man." There is sufficient evidence to show that the dog existed in the domesticated state during prehistoric times; consequently neither history nor tradition is available to solve the question of the jackal. The matter must be decided, if at all, by the naturalist, and the variety of opinion existing on this point at the present time renders it exceedingly improbable that the parentage of the dog will ever be ascertained with certainty. Some suppose that all our breeds have sprung from a single wild source, others that they are the product of the blending of several distinct species. Of the former, the majority regard the wolf as the parent form, others favour the claims of the jackal, while a few regard them as the descendants of an extinct species, and point to the fossil remains of a large dog, found in the later Tertiary deposits, as the probable wild stock. The prevalent belief at the present day is probably that which regards the domestic dog as the product of the crossing of several species, living and extinct. This opinion is founded on such considerations as the presence in the earliest historic times of many breeds (totally distinct from each other, and nearly resembling existing forms), the existence of wild species of dogs in all quarters of the globe, the fondness of savage man for taming wild animals, and the extreme improbability that among so many presumably equally tameable canine species, only one should have been chosen for domestication. Nor is it to be forgotten, as Darwin has well shown, that fear of man in most wild animals is a gradually acquired instinct, and that before its acquirement a wild species would have been much more readily tamed than after. Thus the wild dog of the Falkland Islands (Canis antarcticus), when these were first visited by man, approached him without sign either of fear or of aversion. The weightiest reason for this opinion, however, lies in the fact that many of the breeds of domestic dogs, found in different countries, bear a more or less striking resemblance to the wild species and to the jackals, both of which are closely related to the wolf. The widely distributed Indian dogs; and the wolves and jackals of North America resemble the wolf of the same regions, both in appearance and in voice, that Sir J. Richardson on one occasion mistook a pack of these wild animals for a troop of Indian dogs; and the Indians are said to take the young of wolves in order to improve the same breed, which would seem to prove that the dog and wolf are sufficiently fertile inter se. The Hare Indian or Mackenzie River Dog, although somewhat smaller in size than the prairie wolf (Canis latrans) occurring in the same regions, so resembles the latter that Richardson could detect no decided difference in form. It seems, in fact, to bear the same relation to the prairie wolf that the Eskimo dog does to the grey wolf already mentioned. The wolf certainly exhibits few peculiarly dog-like qualities, being both ferocious and cowardly, and showing no attachment to man; but instances, nevertheless, are on record of tamed wolves which in their gentleness, in love for their masters, and in intelligence, showed true dog-like capacity. The Eskimo dogs are likewise decidedly wolfish in disposition, showing little or no attachment to their owners, and sometimes, it is said, even attacking them when pressed by hunger. Distinct varieties of the wolf occur in Europe and in India, and such European breeds as the shepherd dog of Hungary so closely resemble the wolf that an Hungarian has been known to mistake that animal for one of his own dogs; while certain of the Hindu pariah dogs are said by Blyth to resemble the Indian variety of wolf. The large semi-domesticated dogs of the northern parts of both hemispheres may thus be regarded as principally derived from the various species and varieties of wolves still existing there. The period of gestation in the wolf and dog is the same, being 63 days in both. In the tropical regions of the Old World the wolf disappears, and with it the prevalence of wolf-like dogs, their places being taken by smaller breeds, such as certain of the pariah dogs of India and Egypt, between which and the jackals must be decided. This structural difference can, according to Geoffroy Saint-Hilaire, be pointed out. Their period of gestation agrees with that of the dog and wolf, and like dogs, tamed jackals when caressed "will," says Darwin, "jump about for joy, wag their tails, lower their ears, lick their master's hands, crouch down and even throw themselves on the ground belly upwards;" when frightened, also, they carry their tails between their legs. Jackals associate readily with dogs, and their hybrid offspring are not sterile; there is also an instance on record of one of these which barked like an ordinary dog. The habit of barking, so characteristic of dogs, is not, however, universal among them; the domestic dogs of Guinea and certain Mexican breeds being described.
Dogs as dumb. This faculty appears to be readily lost and to be capable of reacquaintance. The domestic dogs which ran wild on the island of Juan Fernandez are said to have lost the power of barking in 53 years, and to have gradually reacquired it on removal from the island. The Harle Indian Dog makes an attempt at barking, which usually ends in a howl, but the young of the breed born in the Zoological Gardens seem to possess this faculty to the full extent. In tropical America, where jackals are unknown, there are several wild species of dogs to which the domestic breeds of those regions bear a considerable resemblance, and at the present day the Arawak Indians cross their dogs with an aboriginal wild species for the purpose of improving the breed. In Australia the Dingo, regarded by many as constituting a distinct species indigenous to that country, its remains having been found in caves associated with those of other extinct mammals, occurs both in the wild state and domesticated at the present day. Darwin, after reviewing this question, concludes that “it is highly probable that the domestic dogs of the world have descended from two good species of wolves (Canis lupus and C. latrans), and from two or three other doubtful species of wolves, namely, the European, Indian, and North African forms, from at least one or two South American canine species, from several races or species of the jackal, and perhaps from one or more extinct species.”

Remains of the dog, of Neolithic age, occur in the kitchen-middens of Denmark, and in similar deposits in Switzerland. In Denmark the earliest known dog is followed, in the Bronze period, by a larger breed, and that by a still larger form in the succeeding or Iron period; while a somewhat similar succession occurs in Switzerland. These successive changes, however, may merely indicate the appearance in those countries of new races of predatory man, who brought with them their own dogs. In historic times the earliest records of the dog are to be found in the figures of these animals on Egyptian monuments from three to five thousand years old, and these show that thus early, such varieties as the hound, greyhound, watch-dog, and turnspit were cultivated on the banks of the Nile. By the ancient Egyptians the dog was worshipped under the title Anubis, as the genius of the River Nile,—the aper of all lands, the protector of Suiris, the dog star, corresponding with the time of the annual rise of that river. The city of Cynopolis was built in its honour, and there its worship was carried on with great pomp. Certain kinds of dogs were regularly sacrificed to Anubis, their bodies being afterward embalmed, and occasionally these are still found. The earliest record of the dog in sacred history is in connection with the sojourn of the Israelites in Egypt; and the religious homage paid to it by its oppressors may probably explain why the Jews were taught to regard it as unclean. Under Moslem law, which in many matters was founded upon Jewish practices, the dog occupies an equally degraded position; and through-out Mahometan countries at the present day, their generally wretched condition bears ample testimony to the neglect and ill-treatment to which for centuries they have been subjected. The pariah dogs of Eastern cities know no master, they prowel about the streets in troops, eating whatever garbage may come in their way, thus serving the useful purpose of scavengers, and occasionally receiving a meal from the more humane of the habitants. On no account, however, must even the garments of an orthodox Mahometan be defiled by the touch of his dog, in its sleep or otherwise, and such is the intelligence and sagacity of these ownerless curs that, having become aware by painful experience of this religious prejudices, they seem to take the greatest care to avoid giving such offence. The value set upon the dog by the Egyptians seems to have been shared in by the ancient Greeks and Romans, who possessed many breeds closely allied to still existing forms. Those early breeds, however, are remarkable for the entire absence of pendulous ears, which do not make their appearance till near the decline of the Roman empire. By both Greeks and Romans they were employed in the chase, and in war, and for the latter purpose they were armed with spiked collars, and sometimes even with a coat of mail. Cortes was said to have been saved by 59 war dogs, which attacked the enemy that had landed while the garrison slept, and which fought with unbounded courage till all were killed except one, which succeeded in rousing the garrison. Shakespeare thus put no figure of speech in the mouth of Antony when he exclaimed—

“Cry havoc, and let slip the dogs of war”

Dogs are naturally carnivorous, preferring flesh that is slightly putrid; but they can also live on vegetable food, and in countries where the dog itself is eaten, it is generally thus fed. In drinking it laps with its tongue, and it never perseveres, although when heated its tongue hangs from its mouth, and a fluid runs from it. When about to sleep, no matter where, it turns round and round, and scratches the ground with its forepaws as if to form a hollow couch; and in this seemingly senseless action it is no doubt continuing a habit once found useful to its wild progenitors. Its sense of smell and hearing are exceedingly acute, and many suppose that the remarkable power possessed by the dog, in common with the cat, of finding its way for great distances along unknown roads may be due to the exercise of the former sense. The differences that obtain between the various breeds of dogs are very great, the skulls, according to Cuvier, differing more from each other than they do in the different species of a natural genus. The molar teeth, which normally consist of 6 pairs above and 7 below, sometimes number 7 pairs above and below, while in the hairless dog of Egypt the teeth are sometimes reduced to a single molar on each side. Incisors and canines being entirely wanting. Some varieties are six times as long as others, excluding the tail, and the number of vertebrae in the latter organ is also exceedingly various; nor is the number of mammm always uniform, there being 5 on each side in some, and 4 in others, while occasionally the number on the two sides is unequal.

While man has thus bestowed great attention on the physical development of the dog, and availing himself of natural variations has, by careful selection and intercrossing, moulded the dog into an almost innumerable forms, he has also, by education, developed its moral and intellectual capabilities, so that the dog may, in this respect, be said to have, within its own limits, kept pace with its master’s advancement; and it is undoubtedly owing to a certain community of feeling existing between dog and man that this domestic animal has, since the earliest times, been regarded as the companion as well as the humble servant of mankind. There are few human passions not shared in by the dog. It is, like him, subject to anger, jealousy, envy, love, hatred, and grief, it shows gratitude, pride, generosity, and fear. It sympathizes with his master’s advancement, and it is undoubtedly owing to a certain community of feeling existing between dog and man that this domestic animal has, since the earliest times, been regarded as the companion as well as the humble servant of mankind.
courageous dog will often tremble at the sudden rustle of a leaf. While the possession of such faculties has rendered him fit above all other animals for the companionship of man, the physical and intellectual qualities characteristic of the various breeds have been seized upon and developed to their utmost by man, so as to enable him to use the dog for a great variety of purposes; what these are will appear in the following necessarily brief account of the more important breeds of dogs.

According to Professor Fitzinger, there are at least 189 distinct varieties of the domestic dog, and when it is considered that the origin of many if not most of these is uncertain, it is not surprising that considerable difference of opinion should exist as to the most natural mode of grouping them together. Their arrangement into the following six races, founded to a certain extent on the form and development of the ears, probably affords an approximation to a natural classification, viz., WOLF-DOGS, GREYHOUNDS, SPANIELS, HOUNDS, MASTIFFS, and TERRIERS.

Wolf-DoGS.—Throughout the northern regions of both hemispheres there are several breeds of semi-domesticated wolf-like dogs having nearly erect ears, and long woolly hair; these include among others the dogs of the Esquimaux and the Kamtschatdales. The Esquimaux Dog is usually of a black and white colour, nearly as large as a wolf, with a fine bushy tail, and sharp pointed muzzle. It is of the greatest value to the inhabitants of the boreal regions of America in hunting the seal, bear, and reindeer; while it is equally useful as a beast of burden, carrying loads on its back—a kind of work for which dogs are by no means well suited—and drawing sledges over the snow. On a good road half a dozen of these dogs will draw, it is said, from 8 to 10 cwt., at the rate of 7 miles an hour, and Kane, the Arctic traveller, tells how that number of dogs, well worn by previous travel, carried him with a fully burdened sledge, between seven and eight hundred miles during the first fortnight after leaving his ship—a mean rate of 57 miles a day. According to the same authority, the training of these dogs is of the most ungracious sort.

"I never heard," he says, "a kind accent from the Esquimaux to his dog. The driver's whip of walrus hide, some 20 feet long, a stone or a lump of ice skilfully directed, an impertinent loud and sharp, made emphatic by the fast or foot, and a grudged ration of seal's meat, make up the winter's entertainment of an Esquimaux team." Owing to the ill-treatment to which they are thus habitually subjected, they are highly irritable and difficult to manage, and in sleighing it is necessary to have a well-trained dog as leader, to whom the driver speaks, and by whom the other dogs in the team are guided. They readily relapse into the wild state, and have been known thus to hunt the reindeer in packs like wolves. These dogs have borne a prominent part in Arctic exploration, and much of the difficult work done in this field would have been well-nigh impossible without them. The Kamtschatka dogs are also used for sledding, and are famed for their swiftness and endurance. During summer they run at large and eat for themselves, returning in winter to their masters, who feed them principally with the heads of dried fish.

The Sheep-dog.—In Eastern countries where the sheep follow the shepherd, the duties that fall upon the dog are simpler, and require less intelligence, than those performed by the European breeds. Their task is chiefly to defend the flocks and herds from wild beasts and robbers, and for this purpose the wolf-like Turkoman Watch-dog and the Sheep-dog of Natolia are, by their great strength and courage, eminently fitted. The former is described by Sir J. M'Neill as a shaggy animal, nearly as large as the Newfound dog, and very fierce and powerful, the dam of the specimen he describes having killed a full-grown wolf without assistance. The sheep-dog of Europe is generally classed among the wolf-like dogs, owing to the erect or semi-erect character of its ears, its pointed nose, and shaggy covering; and Buffon, for such reasons, regarded it as nearest to the primitive type of the domestic dog. It is more reasonable to suppose with Martin (History of the Dog) that these points "only indicate purity of breed unalloyed by admixture with other varieties." The fact that its life is spent almost entirely out of doors, and that it has little or no opportunity of mixing with dogs other than of its own kind, would tend to preserve uniformity in external appearance; while its high cerebral development and intelligence prove beyond a doubt that the breed of sheep-dogs is one of the most highly improved, and in this respect remotest from the primitive type. Its whole intellect is devoted to the one duty of tending its master's flocks, and in the performance of this it is equally sagacious, vigilant, and patient. At a word, or even a look, from its master, it will gather the sheep, scattered for miles around, to one place. During and after the snowstorms to which highland districts are so frequently exposed, the sheep-dog is invaluable in saving its master's property from almost total destruction. Without it the Highlands of Scotland would be almost useless for sheep-farming purposes.

"It would require," says the Ettrick Shepherd, "more hands to manage a stock of sheep, gather them from the hills, force them into houses and folds, and drive them to markets, than the profits of the whole stock would be capable of maintaining." The sheep-dog stands about

![Sheep Dog](https://via.placeholder.com/150)

15 inches high, is covered with long shaggy hair of a black colour varied with dark grey or fawn-brown, and its tail is of moderate length, slightly recurved and bristly. In disposition it is quiet; and although not quarrelsome, it shows great courage in defending its charge. It will not wantonly attack a stranger, but evidently regards him with suspicion, and rejects all friendly advances. There are three varieties of the sheep dog found in Great Britain, viz.—the Scotch Collie, standing only from 12 to 14 inches high, and regarded as the purest and most intelligent; the Southern Sheep-dog, of larger size, but with shorter fur, and having the tail often very short—a peculiarity which, according to Bell, "appears to be perpetuated from parents whose tails have been cut;" and the Drover's Dog or Cur, generally black and white in colour, and taller in its limbs than the others. It is employed in driving sheep and cattle to the city markets, and in the discharge of this duty shows intelligence quite equal to that of the other varieties; although in the treatment of the herds under its charge, it often displays a more savage disposition. The sheep-dogs of South America are so fashioned as to unite in themselves the duties of dog and shepherd. "When rising," says Darwin, "it is a common thing to meet a large flock of sheep, guarded by one or two
dogs, at the distance of some miles from any house
or man." And in inquiry he found out the method
by which this friendship between dog and sheep had been
established. The dog when a puppy is removed from its
mother, and is no longer allowed to associate with other
dogs, or even with the children of the family. It is kept
in the sheep pen, and suckled by a ewe. Generally also it
is cradled and thus has little or no community of feeling
with its kind. Brought up among the sheep it shows no
desire to leave the flock, but assumes the position of
leader. "It is amusing," says the above writer, "to
observe, when approaching a flock, how the dog immedi-
ately advances barking, and the sheep all close in his rear
as if round the oldest ram." It comes home daily for food,
on receipt of which it immediately returns to the flock,
and thus it is often taught to bring home in the evening.

The Newfoundland and Great St Bernard or Alpine Dogs
occupy an uncertain position, forming, according to some
authors, a group by themselves, and being classed by
others among the wolf-like dogs, although in their large
and pendulous ears they differ widely from the typical forms
already noticed. The Newfoundland Dog is believed to have been brought
to England from the island to which it owes its name, but
probably owing to partial crossing, it differs somewhat from
the original American breed, the latter being smaller in
size, with the muzzle less blunt and, almost totally black in colour.
In Newfoundland and Labrador these dogs are used as beasts of burden, drawing considerable
loads of wood and provisions on sledges. The feet are
practically webbed, and consequently they are unruviled as
water-dogs, and although their weakness of scent and com-
parative slowness of foot renders them useless to the hunter,
yet in a country of fers and morasses, the sportsman finds
them of the greatest service in rescuing birds that have
fallen into the water, nor do they hesitate in their eager-
ess for retrieving to make their way through the roughest
cover. The English variety of Newfoundland Dog is a
noble creature, standing 30 inches high at the shoulders,
even in confinement such cases are altogether exceptional.

This breed is supposed by some not to be indigenous to
North America, but to have been introduced either on the
first discovery of Newfoundland by the Norwegians about
the year 1000, or on their arrival here by Cabot in 1497.
The Norwegians, according to Martin, have dogs closely
resembling the Newfoundland breed, which are used in
hunting bears and wolves, and which are armed with spiked
collars in order to protect them from the wolves which seek
to seize them by the throat. The Great St Bernard Dog
of the present day is a powerful animal, as large as a
mastiff, with close short hair and pendulous ears, and
varying in colour, in one case being described as "sandy
tawny" with black muzzle, in another as "more or
less marked with grey, liver, and black clouds." Previous to 1820 there existed another breed of these dogs,
closely allied in form and size to the Newfoundland, but
in that year the greater portion of them died of an
epidemic, which necessitated the introduction of the present
variety. These dogs are kept by the monks of the Hospice
of St Bernard, situated on one of the most
dangerous passes between Switzerland and Italy, near the
top of the Great St Bernard, where they are trained to the
work of rescuing travellers who, overtaken by the snow-
storm, may have lost their way, or sunk benumbed by the
icy gusts. On such occasions these dogs are set out from the convent in pairs, one bearing a flank
of spouts attached to his neck, the other with a cloak
Should they come upon the bailed yet struggling traveller, they conduct him to the convent, but should he have
succumbed and be covered by the snow, their keen scent
detects his pre-ence although buried several feet beneath
the surface. By loud barking—and a young dog of this
breed kept many years ago in the suburbs of Edinburgh
was able to make itself heard a mile away—they apprise
the monks of the need of succour, while with their feet
they attempt to clear away the snow from the body.
In this way these dogs are instrumental in saving many lives
every year, although often at the sacrifice of their own,
one dog which thus met its death bore a medal stating
that it had been the means of saving twenty-two lives

If Greathoundus—Representations on Egyptian monu-
ments prove the existence of the greyhound race of dogs
at least 3000 years ago, and the silky-haired breeds existing
in Egypt, Arabia, and Persia at the present day are
probably the slightly modified descendants of those ancient
forms. The numerous varieties of this race may be con-
veniently grouped into the wire-haired and smooth-haired
breeds,—of the first of which the Irish Greyhound or Wolf-
dog is an example. In former times this magnificent breed
was employed in Ireland in hunting the wolf and the stag,
but the extermination of these beasts of chase led to the
neglect and consequent degeneracy of the breed, and it has
now become extinct in that country. It was probably in-
troduced from the sister isle into Scotland, where its
modified descendant, the Scottish Deerhound, in hunting the
stag still bears testimony to the great strength and
agility of its progenitor. The Old English Greyhound was
only allowed to be kept by the nobles and princesses, and the
killing of it was, under the old game laws, a felony punish-
able by death. It was employed in coursing the red deer
and fallow deer, and Queen Elizabeth is said to have
witnessed, on one occasion, the pulling down of 150
bucks by greyhounds. These must have been much more
powerful animals than the modern English breed, which, how-
ever, is regarded as the finest of the smooth-haired grey-
hounds. In speed and wind it is unrivalled, all other
points having been sacrificed to these by breeders. It has
thus almost lost the power of scent, and is the only dog
that hunts by sight alone, hence probably the name gue-

FIG. 2.—Newfoundland Dog.
hound formerly applied to it. According to Daniel, its speed on flat ground is little inferior to that of a racehorse, while on hilly ground it is probably superior to it. Every part of its body is suggestive of activity and speed—the long and pointed muzzle, the narrow head, thin neck, chest deep and flanks contracted, long slender legs, and the tail narrow and curved upwards. It is exceedingly docile, good-tempered, and affectionate. The colour varies in different breeds, and even in individuals of the same breed. Bell suggests that the greyhound may owe its name to the prevailing colour of the original stock; while others, with more probability, derive it from the ancient British *grech or grey*, a dog. The Italian greyhound is a small but exceedingly elegant and delicate breed, reared in this country to the parlour as a ladies' pet. The Lurcher is supposed to be the result of a cross between the rough greyhound and the sheep-dog, having the sharp, pointed muzzle of the former, and owing its diminished height but greater stouthisness to the latter. It resembles the sheep-dog still more in its great intelligence, and in devotion to its master. This breed is usually the poacher, and in his illegal pursuit of game, the keenness of scent, the cunning, and the absolute silence of this dog render it the most suitable of all for such nocturnal work. It waylays the rabbit returning to its burrow, its cunning circumvents the hare where its speed would not avail, and it has strength sufficient to pull down the fallow deer. According to Colonel Smith these dogs sometimes run wild when their owners are captured and imprisoned, and when thus catering for themselves they have been regularly hunted with hounds.

III. SPANIELS.—The spaniels are characterized by large pendulous ears, long silky hair often curled and shaggy, and acute scent. In cerebral development, and, consequently in intelligence, they are probably superior to all other dogs, while they are unrivalled in docility and in devotion to man's service. They include the Common Spaniel, the Water Dog, and the Setter, besides numerous fancy varieties, as King Charles's Spaniel, the Blenheim Spaniel, and the Maltese Dog. The Spaniel is the favourite of the sportsman, entering more than any other dog into his master's feelings, and seeming to enjoy the sport for its own sake. It is elegant in form, with remarkably long ears, and beautifully waved hair, usually of a red and white colour. It takes readily to the water, and has been known to exhibit a remarkable propensity, as well as great dexterity, in fish-catching. The Water Dog is larger than the spaniel, and is covered with abundant curly hair. Its colour is generally a mixture of black and white. From its aquatic habits it is of great service to the water-fowl sportsman as a retriever. It is readily taught to fetch and carry, and the sagacity which it shows in finding any article it has once seen, but which has afterwards been lost or purposely concealed, is truly remarkable. The Setter is also a favourite with sportsmen, its habit of crouching when it has scented game rendering it specially serviceable. This habit, like that of pointing, is probably, as Darwin suggests, “merely the exaggerated pause of an animal about to spring on its prey.” It is generally white in colour, with large liver-coloured spots.

IV. HOUNDS.—Hounds are those dogs with long pendulous ears, close hair, and long deep muzzle which hunt by scent. They include the Bloodhound, Staghound, Foxhound, Harrier or Beagle, and Pointer.

The Bloodhound, regarded by many as the original stock from which all the other varieties of British hounds have been derived, is now rarely to be met with in entire purity. Its distinguishing features are long, smooth, and pendulous ears, from 8 to 9 inches in length, full muzzle, broad breast, muscular limbs, and a deep sonorous voice. The prevailing colour is a reddish tan, darkening towards the upper part, and often varied with large black spots. It stands about 28 inches high. The bloodhound is remarkable for the acuteness of its scent, its discrimination in keeping to the particular scent on which it is first laid, and the intelligence and pertinacity with which it pursues its object to a successful issue. These qualities have been taken advantage of not only in the chase, but also in pursuit of felons and fugitives of every kind. According to Strabo, these dogs were used in an attack upon the Gauls. In the clan feuds of the Scottish Highlands, and in the frequent wars between England and Scotland, they were regularly employed in tracking fugitive warriors, and were thus employed, according to earlychroniclers, in pursuit of Wallace and Bruce. The former is said to have put the Sleuth-hound, as it was called, off the scent by killing a suspected follower, on whose corpse the hound stood.

“Nor further moved 'tis time she found the blood.”

For a similar purpose captives were often killed. Bruce is said to have baffled his dogged pursuer as effectually, though less cruelly, by wading some distance down a stream, and then ascending a tree by a branch which overhung the water, and thus breaking the scent. In the histories of border feuds these dogs constantly appear as employed in the pursuit of enemies, and the renown of the warrior was great who,

“By wily turns and desperate bounds
Had baffled Percy a best blood-hound.”

In suppressing the Irish rebellion in the time of Queen Elizabeth, the earl of Essex had, it is said, 800 of these animals accompanying the army, while in later times they
became the terror of deer-stealers, and for this purpose were kept by the earls of Buccleuch so late as the 18th century, and even at the present time their remarkable power of scent is occasionally employed with success in the detection of murder. The Cuban Bloodhound is of Spanish descent, and differs considerably in form from the English variety, having small, though pendulous ears, with the nose more pointed, and with a more ferocious appearance. Its employment in the capture of runaway slaves, and in the cruelties connected with the suppression of negro insurrections, has brought the animal into the evil repute which more properly belongs to the inhuman masters, who thus prostituted the courage, sagacity, and pertinacity of this noble dog to such revolting purposes.

The Staghound has been generally regarded as the result of a cross between the slow-paced old southern hound and the fleet foxhound; but it has been objected that the breed was known in England long before the foxhound was made use of, and indeed before there was an animal at all resembling the one which is now known by that term, and those who maintain this view regard the staghound as a bloodhound crossed with some lighter dog, as a greyhound or a lurcher. However produced, it is a majestic dog, of great strength and considerable swiftness, besides possessing in common with the bloodhound, and with it alone, the property of unerringly tracing the scent it is first laid upon among a hundred others. In the reign of George III., who was himself ardently attached to the sport of stag-hunting, packs of these dogs were maintained in several parts of the country, but since the death of that monarch this form of hunting has declined, and the total extinction of these dogs at no distant date seems probable.

The Foxhound is the hunting-dog upon which the breeder has bestowed the greatest pains, and, according to Bell (British Quadrupeds), his efforts have been rewarded "by the attainment of the highest possible degree of excellence in the union of fine scent, fleetness, strength, perseverance, and temper." It stands usually from 20 to 22 inches high at the shoulders, and is of a white colour, marked with large clouds of black and tan. Its speed is such that a foxhound has been known to get over 4 miles in 7 minutes, while its endurance has been shown in such cases as the 10 hours' continuous run performed by the duke of Richmond's hounds in 1738 before killing the fox, during which many of the sportsmen tired three horses, and several of the latter died during the chase. The Harrier is smaller than the foxhound, not exceeding 18 inches in height at the shoulders, and is exclusively used, as the name shows, in hunting the hare. Of late years it has been greatly improved, so as to be almost literally a foxhound in minia-
perfect unless used to one scent and one style of hunting." A still smaller hound is the Beagle, from 12 to 14 inches high, the most diminutive of the hunting dogs. It was formerly a great favourite, being used in hunting the hare, but in this it has been almost wholly superseded by the hounds.

Mastiffs.—The Mastiff race of dogs is characterized by extreme shortness and breadth of muzzle, enormous strength of jaws, and general robustness of form. It includes the Mastiff, the Bull-dog, and the Fug. The Mastiff equals in courage, while in strength, intelligence, and mildness of dispositions it excels, its near ally the bull-dog. It is commonly supposed to have been the breed of large dogs abundant in Britain during Roman times, which were exported in large numbers to Rome for the purpose of fighting in the Amphitheatre, although Colonel Smith believes that these early British dogs were only bull-dogs of a larger size than the present breed, and that the mastiff was introduced into Britain from the cold regions of Central Asia. It is a large dog, standing 30 inches high at the shoulders, with thick muzzle, pendulous lips, and heavy expression, drooping, and the tail well developed. It is usually of a buff-colour, with ears and muzzle darker. Although fierce in combat, it does not attack without considerable provocation, and it bears the teachings of children with the greatest good nature. When in former times it entered into combat with wild animals, it has been known to engage a bear, a leopard, and a lion, and pull each of them down in succession. At the present time the breed is rarely met with pure, and is chiefly useful as a watch-dog, its sagacity and fidelity in this capacity being well known. While he shows great attachment to man when made his companion, the temper of the mastiff becomes soured by confinement, and he is then dangerous to strangers. The Thibet Mastiff is larger than the English breed, and its countenance is still heavier. It is the watch-dog of the tribes inhabiting Thibet and the Central Asian table-land, to whom it is strongly attached, although exceedingly savage towards strangers. There is a large mastiff figured on an Assyrian sculpture, 640 B.C., and Sir H. Rawlinson states that similar dogs are still imported into that country. The Bull-dog is the least sagacious, as well as the most ferocious and obdurate, of the dog tribe. It is smaller than the mastiff, but is strongly built. Its broad, thick head, the projection of the lower jaw beyond the upper disclosing the incisor teeth, the sudden rise of the head from the face, and the scowling expression of the eyes, combine to make the countenance of the bull-dog terrible. Bell points out, in his History of British Quadrupeds, the resemblance in the deep chest, the narrow loins, muscular limbs, and staid tapering tail of the bull-dog to the elegant form of the greyhound. The chief difference appears in the muzzle, a variation which may have suddenly arisen in a single individual, and been perpetuated in its progeny. The ears of the bull-dog are short and semi-erect, and the nostrils distended; the colour varies, being brindled in some, and black and white in others. It is essentially a fighting-dog, and was formerly bred for the brutal sport of bull-baiting, in which its terrible obstinacy usually gained for it the victory. It differs from other dogs in giving no warning of its attack by preliminary barking, and when once it has fixed its teeth into the object of attack, no amount of torture will cause it to relax its hold. Colonel Smith states that he has seen one "whining down an American bison and holding his nose down till the animal gradually brought forward its hind feet, and, crushing the dog to death, tore his muzzle out of the fangs, most dreadfully mangled," and there is an instance on record of its returning to the attack on a bull.

FIG. 9.—Dalmatian Dog.

FIG. 10.—Mastiff.
after each of its feet had been cut off in succession. The intelligence of this breed has been but slightly developed, and it exhibits little of that attachment to man which characterizes other dogs, although it may be said to show a sullen sort of fondness for its master. The Spanish Bull-dog is larger and more powerful than the English breed. The Pug-dog, which in form might be described as a miniature bull-dog, is probably a monstrous variety, rather than a degenerate form, of the bull-dog. It is, however, wholly unlike the latter in disposition, being timid and good-tempered, and is kept only as a pet, for which its dulness of intellect scarcely fits it.

VI. TERRIERS — These include the numerous varieties of Terrier dog, and the Turnspit. The Terrier is a small but very distinct breed, and is probably one of the oldest dogs

found in Great Britain. Three distinct varieties exist in this country, viz., the English Terrier, smooth and graceful in form, with sharp muzzle and erect ears, compact body, strong though slender limbs, and tail carried aloft and somewhat curled—the colour being black, with the belly and extremities usually tan, but sometimes white, the Scotch Terrier, differing from the former in the shortness of the muzzle and limbs, and in the rough wiry character of the hair, which is usually of a dirty white color; and the Skye Terrier, distinguished by the length and coarseness of its hair, the extreme shortness of its limbs, and the great length of its body, its of a light brown color. The Terrier in all its varieties is an exceedingly bold, active, and intelligent dog. It was formerly a regular accomplishment to every pack of hounds, for the purpose of unearthing the fox, and to its eagerness in taking the earth it owes its name. Terriers are now chiefly employed in the destruction of otters, badgers, weasels, and rats, a form of sport which they owe to their having been formerly employed in turning kitchen spits by working inside a wheel, which when once set in motion forced the dog to continue running.

At Caerleon in Monmouthshire, a few years ago, a dog of this kind might have been seen thus employed in the inn kitchen. The Turnspit is characterized by great length of body and extreme shortness of limb, the latter being generally crooked.

DOGE, a modified form of the ordinary Italian duce, from the Latin dux, a leader or duke, employed to designate the chief magistrate in the republics of Genoa and Venice. In both cities the office underwent from time to time a variety of transformations, for details on which the larger histories of the republics must be consulted.

In Venice the doge was originally chosen by universal suffrage, held office for life, and was regarded as the civil, military, and ecclesiastical chief. His duties and prerogatives were not defined with much precision, and the limits of his ability and ambition were practically the limits of his power. In 755 his independence was diminished by the appointment of two assistants or duumviri, but this institution was again allowed to fall into the background, and the dogs acquired more and more importance and authority, while at the same time the office was usually committed to a member of one or other of the more powerful families. This tendency towards a hereditary despotism was checked in 1033 by Flabagno's law, which reinstated the duumvirs, and declared distinctly that no doge had the right of associating any member of his family with himself in the government, or of transmitting his office on his decease. In 1172 a still more important change was introduced, not only was the duumvirate replaced by a body of six councillors, but universal suffrage was abolished, and the election of the doge intrusted to a committee of twelve persons, elaborately selected from the members of the great council. On the death of Ziani II in 1222, two commissions were appointed, which obtained a permanent place in the constitution, and gave emphatic testimony to the fact that the doge was merely the highest servant of the community; the first consisted of five Correttori della promozione ducal, whose duty was to consider if any change ought to be made in the oath of investiture administered to the doge, the second was a board of three registratori sul doge, entrusted with the curious task of examining and passing judgment on the acts of deceased magistrate, whose estates might be mulcted in accordance with their decision. To minimize as far as possible the influence of individual families, the election of the doge was in 1268 effected by a curiously complex machinery, which remained, with some modifications, till the close of the republic. Forty-five members of the great council, elected by ballot, selected nine members, who in their turn chose forty, of these forty twelve taken by lot chose twenty-five, the twenty-five were next reduced to nine, the nine elected forty-five, the forty-five were reduced to eleven, and the eleven chose the final forty-one in whose hands lay the actual election of the doge. In proportion to the development attained by the oligarchical element in the constitution, the more important functions of the office were assigned to other officials or to administrative boards, and he who had once been really the pilot of the ship became little more than an animated figure-head, properly draped and garnished. On state occasions he was still attended by all the ceremonial observances of former times: his robe was still purple, the horns of his beretta were still exalted, the sword, the tapers, and the trumpets were borne before him, his leaden seal was affixed to public documents, and the ring was still dropped yearly from his hand in symbolicespousal of Venice and the sea. But he was under the strictest surveillance, had to wait for the presence of other officials in order to open the despatches from foreign powers, was forbidden to leave the city, could not legally.
be possessed of property in a foreign land, or contract a foreign alliance for any of his children, and was moreover liable to the infliction of a fine for any trespass he might commit. The office was maintained, however, till the last days of the republic, and from time to time was held by men who knew how to make it something more than such an empty simulacrum. (See Cestetti, Il Doge di Venezia, 1858.)

In Genoa the institution of the doge dates from 1339, and at first he was elected without any restriction by popular suffrage, and held office for life; but after the reform effected by Andrea Doria in 1528, the term was reduced to two years. Plebeians were declared ineligible, and the appointment was intrusted to the members of the great and the little councils, who were bound, however, to employ, in proof of impartiality, nearly as complex a machinery as that of the later Venetians.

DOG-FISH, a name applied to several species of the smaller sharks, and given in common with such names as hound and beagle, owing to the habit these fishes have of pursuing or hunting their prey in packs. The Small-spotted Dog-fish or Rough Hound (Scylium canicula) and the Large-spotted or Nurse Hound (Scylium catula) are also known as ground-sharks. They keep near the sea bottom, feeding chiefly on the smaller fishes and Crustacea, and causing great annoyance to the fishermen by the readiness with which they take bait. They differ from the majority of sharks, and resemble the nays in being ovoviviparous. Their young are brought forth inclosed in semi-transparent horny cases, known on the British coasts as mermaids’ purses, and these have tendril-like prolongations from each of the four corners, by means of which they are moored to sea-weed or some other fixed object near the shore, until the young dog-fish is ready to make its exit. The larger of these species attains a length of 4 to 5 feet, the smaller rarely more than 30 inches. The Pickled Dog-fish (Acantias taylori) is pre-eminently the dog-fish. It is the smallest and most abundant of the British sharks, and occurs in the temperate seas of both northern and southern hemispheres. It rarely attains a length of two feet, the female, as in most sharks, being larger than the male. The body is round and tapering, the snout projects, and the mouth is placed far under. There are two dorsal fins, each of which is armed on its anterior edge with a sharp and slightly curved spine, hence its name "picked." In order to strike with these spines the fish first bends itself into a bow, and by a quick motion causes them to spring asunder in opposite directions, seldom failing thus to strike the object aimed at. The dog-fish is exceedingly prolific, the female, according to Couch, producing young almost daily for 9 or 10 months in the year. These are not contained in egg cases, as in the ground-sharks, but are produced alive. It is gregarious, and is abundant at all seasons everywhere on the British coasts. In 1868 an enormous skull of dog-fish, many square miles in extent, appeared in the north of Scotland, when, says Couch, "they were to be found floating in myriads on the surface of every harbour." They are the special enemies of the fisherman, injuring his nets, removing the hooks from his lines, and spoiling his fish for the market by biting pieces out of them as they hang on his lines. Still greater injury is caused to the fisheries by the predacious habits of the Socialiius, and the wholesale destruction of small fishes by this predacious species. They are, however, eaten, both fresh and salted, by fishermen, especially on the west coast of England.

DOG-MATIC (Germ. Dogmatik) is the name usually given by modern writers, especially on the Continent, to that branch of theological study which treats of the dogmas of Christianity. As there are considerable varieties in the conception and treatment of dogmatic by different theologians, churches, and schools, it will be best to give an historical account of the origin and usage of the term.

The Greek word δόγμα, from which it is derived, has two origi and meanings, one of which is found in the LXX. and New Testament, while the other is given to it by some of the ancient philosophical writers. According to the former sense, it denotes a decree or ordinance, i.e., a precept or given to the conduct or observance, proceeding from human or divine authority (Luke ii. 1, Acts xvi. 4, Eph. ii. 15). This is the only meaning in which the word is used in Scripture; but by Plato, Cicero, Seneca, and others it is employed to denote the doctrines of the philosophers, i.e., principles or theories formulated or accepted in the different schools. In this latter sense the word was used by the early Christian writers, as describing indifferently heathen, Christian, or heretical doctrines, as the case might be; although sometimes, when the word was applied to the Christian verities, it may have acquired, from the other use of it, a certain degree of the usury of authority of the doctrines of the faith. As early as Cyril of Jerusalem (Catech. iv. 2) the distinction was made between the doctrinal and the moral elements of Christianity; and the term δόγμα was appropriated to the former, the latter being called σωφροσυνή.

But it was not till long afterwards that the adjective, "dogmatic," was used to distinguish a particular branch of theological study; for in early times the need of subdivision in the scientific study of Christian truth was not felt, and the name theology was sufficient to describe all works dealing with that subject in any way. The progress of thought and inquiry in the history of the Church has, however, made it possible and necessary to treat the truths of Christianity in various different ways, from distinct points of view; and hence different kinds and departments of theology have come to be distinguished. In the 17th century the divines who wrote systems of theology gave different titles to their works, indicating the special manner of their treatment; e.g., Maastricht, Theologia Theoretico-Practica; T. Turetin, Theol. Elenctica; Marschius, Compendium Theol. Didactico-Elencticum; Quenstedt, Theol. Didactico-Polemica; Baier, Theol. Pontiana.

The title Theologia Dogmatica was first adopted by John Francis Buddeus, a Lutheran divine, in 1724. This terminology was followed by J. H. Michaelis, Sellin, and others, and from it the word Dogmatik as a substantive came into common use in Germany. In England and America, in so far as any specific designation of the general term theology or divinity has been thought necessary, the title "systematic" has been used more than any other description by the schools of "dogmatic." As, however, the division and mutual relations of the various theological studies have been very thoroughly discussed in recent times, especially by German theologians, and as the name "dogmatic" has been largely used by them to denote one principal department of these, there is good reason for its adoption by English writers. Some prefer the form "dogmatics," after the name of "method", "physic," &c., but this seems awkward and needless.

But there is among the best authorities on the subject Nature and a considerable difference as to the proper nature and place of the theoretical sciences of dogmatic. There are two distinct conceptions of its nature, each supported by eminent names, according to one of which it is an historical, and according to the other a philosophical study. The difference may be said to turn on what substantive is to be understood along with the adjective dogmatica. If, according to what was undoubtedly the older usage, we supply theology, then the name "dogmatic theology" would denote the study of God and divine things in a doctrinal manner, or so as to exhibit its results in a series of doctrines. The epithet dogmatic would indicate, not the subject of the
study, but the manner of it; and thus it would fall under the general head of philosophical or systematic theology. This was the older view, and is held in modern times by Julius Müller¹ and Hagenbach.² If, however, it be held, as is held by many moderns, that *scientia* is the substantive understood with *dogmatica*, then the term means the science of doctrines, and has for its object not the Christian realities themselves, but the doctrines that have been formed about them; and as such it must be an historical science. This is the view adopted by Schleiermacher,³ Roth,⁴ Martensen, Oesterley, and others; though the particular form and developement of the general idea differs according to the different views of these writers as to the nature and formation of doctrines. There can be no doubt that an historical and critical study of the doctrines that have been held in the Christian Church or its several branches is a legitimate, and in its own place, not unimportant pursuit, and whether such study should be called dogmatic is a mere question of nomenclature and usage. But it can be as little doubted that this study does not occupy that central place in the theological sciences that has usually been assigned to dogmatic, and is not fitted to supersede that direct study of Christian truth that has long borne the name of theology by way of eminence. Hence some who make dogmatics a merely historical science hold that there is required besides that a science of speculative theology, dealing directly in a philosophical way with the objects of Christian faith; while Al. Schweizer thinks that dogmatics, as a science of dogmas, should be discarded as essentially un-Protestant, and that in its stead should be placed what he calls *Glaubenslehre*. It is clear that we must have some name to express the former conception of dogmatism, and there is no other name so convenient or so generally used as this. On the other hand, all are not agreed on the necessity and importance of a separate science of dogmatism in the historical conception of it; and it is not easy to draw a line of distinction between it and symbolical theology, or the study of the creeds contained in the Nicene or the Irenic. One of these subjects has great content; and such a connection that convenience almost necessitates the plan that has become usual in academic teaching and books, of giving them a separate treatment, and restricting the province of dogmatic to the truths of Christianity that are objects of direct belief, as distinct from its precepts, as matters of duty. Polemic and irenic are branches of theology that have also a very close connection with dogmatism,—the former having for its object the exclusion from the system of Christian doctrine of ideas and opinions that are essentially alien to its principles, and the latter the harmonising or bringing into a relation of mutual toleration views of doctrine which differ in some particulars, and yet are neither of them essentially un-Christian or anti-Christian. These may be regarded as appendices to dogmatics, being the application of its principles to the varieties of belief that exist among Christians.

There are two other studies, of recent origin, whose relation to dogmatics should be defined, as they have sometimes been thought capable of superseding it—biblical theology and the science of religion. The former of these is a development of Scripture exegesis, and seeks, in dealing with the sacred writings, not merely to understand their direct meaning, but to enter into the conceptions of their several writers on the whole subject of religious truth,—to find out from their writings the theology of Paul, or Peter, or John, just as the historian of doctrine endeavours to exposit the theology of Athanasius, Augustine, or Luther. Then, taking a wider view, it groups all the inspired writers of a period together, and seeks to present the theology of the New Testament, or of the Old, just as one may do with the Nicene or the Reformation theology. This is a most interesting and useful study, and much valuable work has been done by it; but it is clearly an historical study, and as such belongs to a different department from dogmatics, if that is placed in philosophical theology. It furnishes important materials for dogmatic, and gives us the power of using Scripture in a more historical way than would be possible without it; but it is not easy to say that any one inspired man, or any one age of the history of revelation, saw the entire system of divine truth as it is in itself, even the most perfect results of biblical theology will only be materials for dogmatic, not dogmatic itself.

The science of religion, again, investigates the various forms of religion among mankind, and by the comparative study of these seeks to discover their origin and mutual relations. It is probably too soon yet to judge what the results of this young and promising study may be, but they should certainly not be despised by the Christian theologian. They may have an important bearing on apologetics, and  

¹ Art "Dogmatik" in Herder's *Real-Encyclopedia für Protestantische Theologie u. Kirche*.  
² *Methodologie der Theologischen Wissenschaften*.  
³ *Kurse Darstellung der theologischen Studien*.  
⁴ Zu Dogmatik.
and consequently the pre-Reformation theology, and much of later theology too, consists either of the mere exposition of certain dicta of authority, biblical or ecclesiastical, or of purely legal rationalization, applying to these the principles of the philosophy current at the time. Only when the Reformers brought out the principle that Christianity is not a new law, but a work of God's grace, reconciling men to himself in Christ, and that as such it must come before theology, was the construction of a system of Christian doctrine on right principles possible. On the basis of the direct experience of reconciliation to God through Jesus Christ, it is possible to raise and investigate the question—what is the nature, the cause, the various parts and relations, of this great work, this new relation into which I as a believer am brought to God? Now this is just the question that dogmatics seeks to answer; for it is, as before said, a scientific treatment of Christianity as the perfect form of supernatural religion. On this view the existence of dogmatics is not due to a primary, but to a secondary necessity of Christian life. The primary necessity for the Christian is a fellowship with God, including a sense of His favor, of His guidance in practical life, and protection against all hostile influence. To this religious fellowship it is not necessary that a completed system of doctrines as distinct from the assumptiori of the truth that they could not have found out for themselves, which is the idea of revelation. But while supernatural religion must include revelation as an essential part of it, this is not the whole, nor even the most vital and important element in it. The divine religion is essentially the establishment of a right relation between man and God, a fellowship between earth and heaven; and it only includes the communication of new truths, because that fellowship must be an intelligent one, brought about in an intelligent way. This work has also been a gradual one, and has had its several successive stages. Scripture represents the call of Abraham, the exodus of Israel from Egypt and covenant of Sinai, the establishment of the kingship and temple worship in Israel, and the messages of the prophets, as so many stages in the history and progress of religion; and the coming of Christ and the foundation of the Christian church is the final stage of its development. Now, later all the earlier stages, Christianity, while it implies the communication of new truth, is essentially a fact or work of history—the establishment of the perfect fellowship of man with God, which is that mediated by Jesus Christ, and the reconciliation effected by His death. It is this conception of Christianity that makes possible a scientific exhibition of it in the form of a system of doctrines as distinct from the simple interpretation of its records. If, according to a notion that early entered and long pervaded the church, Christianity is merely a new law, a revelation of hitherto unknown truths to be believed, precepts to be obeyed, and promises to be hoped for, Christianity has nothing to do but to expand the revelation, ascertain ing the meaning of its several statements, and classifying them according to their subjects or character. Any attempt to gain a scientific knowledge of the realities with which these statements have to do must proceed on general philosophical principles, and not on a specifically Christian foundation. Now this conception of Christianity was the prevailing one up to the time of the Reformation; and consequently the pre-Reformation theology, and much of later theology too, consists either of the mere expositio of certain dicta of authority, biblical or ecclesiastical, or of purely legal rationalization, applying to these the principles of the philosophy current at the time. Only when the Reformers brought out the principle that Christianity is not
knowledge of it, or because we have no means of reducing these materials to their true and natural order. If there are sufficient materials of knowledge about Christianity, and a method by which these may be reduced to a system, the conditions of a scientific dogmatics may be said to exist.

The sources of dogmatic have been variously enumerated by different branches of the church and schools of thought, and the determination of the genuine ones involved the most important issues as to the whole character of the system. We may begin with the lowest and most universally accepted, and then proceed to those in regard to which there is more difference of opinion, and which determine the peculiarities of the dogmatic of different sects or churches. First, then, we may place the testimony of nature to God, which is admitted by nearly all theists to be real and valuable, so far as it goes, and which is clearly recognized in Scripture. The Socinians in the 16th and 17th centuries denied the possibility of any knowledge of God without revelation, but this position, which was zealously defended by the orthodox, has been given up by those who are the nearest modern representatives of the Socinians, and may be said to be held now only by those who would deny all knowledge of God whatever. This natural knowledge of God has sometimes been supposed to be properly Christian dogmatics, and is granted for separate treatment under the title of natural theology, but since most of the truths reached by it are also expressly taught in Scripture, it seems impossible to exclude from their consideration in the Christian system the prior light that nature throws on them. Hence the most orthodox divines admit that reason has as one of its functions in theology that of establishing or confirming some of its doctrines, which are therefore distinguished by many, especially of the Lutherns, as articul'is mixta, being supported by reason and revelation together, from the artisulis pura, which are known by revelation alone. This source of theological knowledge includes the manifestations of the being and character of God, and the nature and destiny of man in the phenomena of the external world, and in the intellect, conscience, and religious affections of man. The importance of it arises from the fact that this natural knowledge of God alone connects the doctrines of revelation with the actual reality of consciousness and experience, and gives to the whole of theology a basis in ascertainable and verifiable fact. Unless we know, on grounds as legitimate as those of any secular science, that God is, and that He is true and good, we cannot rationally receive any revelation from Him, and our whole dogmatics would be a mere castle in the air.

But most Christians, while recognizing the reality and importance of the manifestation of God in nature, consider that this alone is inadequate, in the present condition of mankind, to bring us into that relation to Him which is the true and perfect religion, and all but those who deny the supernatural entirely believe that God has made a special revelation of Himself in Christ. The person of Jesus of Nazareth is for all such the centre of God's saving discovery of himself and of His will to sinners of mankind, in His life and death we have an image of the character of God, and in His teaching, statements of religious truth that are of primary authority. On this account it may be truly said that the person and teaching of Christ is the fountainhead of revealed theology. It would be quite possible to maintain that this is the only source of theological knowledge beyond the teaching of nature; but nearly all who entertain such views of Christ also believe that we have in the writings of His disciples an authoritative record of His words and deeds, and a divinely-taught explanation of their meaning. Hence the Scriptures, at least of the New Testament, are recognized as themselves a direct source of dogmatic material. Some have limited this recognition of an inspired book to the New Testament, as Schleiermacher; but this position virtually rests on the idea that Christ himself is really the only source of religious truth, and that the New Testament Scriptures are not a real communication from God, but only an authentic human record of the revelation He has made of Himself in Christ. When the notion of a truly divine and authoritative Scripture is really admitted, it is impossible, in view of the use made of the Old Testament in the New, to deny the authority of these earlier Scriptures. The coming of Christ was not a sudden isolated appearance, unprepared for and alone, like a lightning-flash in a dark night, it was rather like the rising of the sun after a long and gradually lightening twilight. The way was prepared for Him by a series of historical revelations recorded in the sacred books of the Jewish people, which have from the days of the apostles onwards been regarded as divine by the Christians. It is this continuous line of revelation, from the beginning onwards, that gives Christianity its universality in point of time, as the perfect form of the true religion that has always in some shape or other existed in the world. On this view, the Scriptures of the Old and New Testaments, as testifying of Christ, are the more immediate source of dogmatic materials, and thus is the fundamental Protestant position. The Church of Rome goes further, and maintains, not only that the Divine Spirit has inspired the writers of Scripture to convey to us an authoritative record of God's revelation in Christ, but also that the Spirit so dwells in the church as to enable her to develop that revelation, supplementing it by tradition, authenticating it by her authority, and interpreting it by decsion on controverted points. Hence, for the Romanist, tradition, decrees of councils, and the decrees of the popes, opinions of fathers and doctors of the church, are equally with Scripture authoritative sources of doctrine. In this, however, Protestants hold that they err as much in the way of excess, as Rationalists, who deny the authority of the Bible, err in the way of defect. Those Protestants, however, who have taken the most profound and spiritual view of the subject, and who have taken the most profound and spiritual view of the subject, have been ready to allow that there is provision made in Christianity for what Romanists seek to attain by the authority of the church. They admit that something more is needed than naked human reason for the right interpretation and application of the word of God, but they find this, not in an infallible church, but in the work of the Divine Spirit, enlightening the mind of believers in and with the word (testamentum Spiritus Sancti). The recognition of this, which was very fully and strongly made by the Reformers, not only gives to Protestant theology a firmer position as against the claims of Rome than it can have without it, but also enables us to give their due place to the elements of truth, exaggerated and distorted, in the Romanist doctrines of the authority of the church, fathers, and councils. If we have the witness of the Spirit, giving us an assurance of the character and meaning of Scripture, we must admit that our fellow Christians have the same guidance also, and that believers have had it in all ages. Hence we may reasonably allow great weight to the opinions of men who have given evidence of being guided by the Spirit, and more especially to those doctrines that have been established as scriptural by the great body of the spiritually enlightened in different ages. Thus the teaching of fathers and theologians, and the consent of the Christian church, are important helps and guides to the Protestant theologian; only he does not, like the Roman Catholic, attach absolute

1 Ps. xxi. 1-6; Rom. i. 19-21, Acts xiv. 15-17, v. 24-29. 2 Controverse, Christian Dogmatics, sec viii.
authority to any of them; and he esteems them, not simply because of their antiquity or their official position, but in proportion to the evidence they have given of being really guided by the Divine Spirit, who is the Spirit of holiness, love, peace, and godliness.

This inward spiritual enlightenment of the believer corresponds very nearly to what has been called Christian consciousness, to which a prominent place has been assigned among the sources of theology by many modern divines. The currency of the phrase is due mainly to Schleiermacher; and the form of it proceeds from his fundamental principle, that religion consists properly in feeling, by which we have an immediate consciousness of the divine—a "God-consciousness." Whatever justification this view may have had, as a needed protest against the previously dominant intellectual view, that made religion virtually an affair of the understanding only, it is now generally admitted that Schleiermacher went to an extreme on the other side, and now compulsion, amount of religion can be given that does not include the exercise of thought and will, as well as of feeling. In so far, therefore, as the phrase Christian consciousness represents in its form the one-sided conception of Schleiermacher, it is insufficient; and that which really corresponds to it is the Christian life, with its full complex of beliefs, emotions, and volitions. This, being the work of the Divine Spirit in the soul, may and must be that the process might be reversed and the facts deduced from the most general principles. It is only in a few sciences, e.g., mechanics, that such a degree of perfection has been attained as to enable them to enter on the deductive process. Now it is a question debated by some of the ablest divines, whether theology can adopt this method. It is not denied by any that the inductive method, or that of empirical reflection, as it is called in Germany, is competent; but some maintain that, while this is so, that of speculation is also legitimate and possible, and that it must be followed, if we are to have a theology in the highest and most proper sense of the term. Those who take this position are for the most part of the Hegelian school; and we have a favourable specimen of the way in which it may be maintained in a truly believing spirit in Rothe. But the considerations adduced by Julius Muller against the possibility of such a method, if we are to avoid a pantheistic view of the universe, seem conclusive. The real and thorough-going recognition of personality and free will, both in God and man, makes it impossible to arrive at the phenomena of Christianity by any process of a priori demonstration; and more particularly, neither the fact of sin on the one hand, as the act of the free will of man, nor of grace on the other, as the work of God's free will, can be exhibited in their essential character in such a method. No science that has to do with the events of a real history in which rational and moral agents are recognized as acting with true liberty can be constructed by a priori deduction of logical consequences from abstract necessary first principles. The dogmatic theologian therefore, who maintains the freedom alike of the human and of the divine will, is shut up to the a posteriori method of induction. Even though the existence and attributes of God could be satisfactorily demonstrated by reasoning from necessary truths and laws of thought, as Anselm, Descartes, Clarke, and others thought possible, yet when we come to inquire what God has done, and on what principles He acts, we must, if the world's history is not a mere nature-process, learn from experience and testimony the facts, and ascend inductively from them to the principles or laws that direct them. The inductive method, therefore, is the one proper for Protestant evangelical dogmatics. This is recognized by writers so different in many respects as Dr.

1 This view of the nature and function of Christian consciousness is that taken by Martensen, Dogm., sect. 29; J. T. Beck, Einleitung in das System der Christlichen Lehre; Osterwe, Dogm., sect. 10.

2 Theologische Ethik, sect. 2.

3 Die Christliche Lehre vom der Stunde,—Einleitung.
Chalmers, Julius Müller, Hodge, and it has been practically followed by most evangelical divines. They have indeed sometimes diagnosed the real nature of their method by the arrangement of topics adopted, for the almost universal practice has been to begin the systematic exposition of Christian doctrine with the lustiest and most recondite part of the subject, which would come first in a really deductive treatment, and to descend from them to those that are more immediately verified by experience. This has tended to produce the impression that these systems are properly chains of logical demonstration, especially as doctrines once held to be established are often appealed to as forming part of the proof of other doctrines. In many cases, however, this appearance is deceptive; and the system, though wearing a deductive garb, is not really of that nature. Each of the doctrines established on its own proper basis of Scripture testimony and Christian experience; and the order of progress, from above downward, does not show the order in which the doctrines have been ascertained, either by the church in general or by the individual theologian, but only the order in which it is thought best that they should be exhibited and taught.

Besides these two distinct methods, the speculative or deductive, and the empirico-inductive, a third is recommended by Beck, and approved also by Oosterzee, called by the former the real-genetic. This proceeds on the assumption that the object of theological knowledge is faith, i.e., according to Beck's use of the term, spiritual life in the soul apprehending as its object God in Christ. This faith or spiritual life has, he points out, a principle of development and growth, and theology grows by following the growth of faith in the soul. But the life of faith in us is not perfect, it is liable to hindrances and abnormal development; hence this by itself is not a safe guide for theology. There is, however, a perfect archetype (Ur-bild) of the true and normal development of faith in the soul, and that is to be found in revelation. The revelation of which we find the record in Scripture has the same course of development as the subjective life of faith in the soul; and the growth of revelation is the perfect pattern of what the growth of faith within us should be. In order, therefore, to be a representation of the faith or spiritual life of the Christian in its ideal condition, theology has to follow the development of revelation as presented to us in Scripture, and must first go back to its primary source, and trace from thence its growth and development. Hence the designation of the true dogmatic method as real-genetic. Now whether or not the results of theological inquiry will come out in this particular form depends on the truth or falsehood of a number of positions, and these can only be established by the examination of facts and evidence bearing on the case. This method, therefore, does not in principle differ from the inductive or empirical one; it is only a special form which that method will assume, if the views of Becks as to the relation of revelation to the life of faith in the soul are true and borne out by evidence. It does not, therefore, seem proper to regard this as a distinct kind of method, and we may legitimately claim those who follow it as disciples in general of the inductive school.

On the whole, there appears no reason why the principles of inductive philosophy, which have been so fruitful in their application to the sciences of external nature, should not be applied to materials bearing on the relation of man and the world to their Author, that are furnished by the phenomena of nature, the dictates of conscience, the facts of revelation, and the experience of the Christian life. Surely, too, the endeavour to do this is neither a hopeless nor an impossible one. Those who have objected most strongly to the application of logic to theology, such as Isaac Taylor and Bishop Hampden, will be found at bottom to object chiefly to the use of a merely verbal and deductive system of logic, and not to that inductive method which is the mighty instrument of the progress of modern science. But it must be admitted that the processes of theologians have too often been, and too often still are, of that merely formal and logical kind that cannot really increase our store of knowledge. If dogmatism is to hold its ground as a true science at all, it must frankly and consistently adopt the inductive method; and it must take as the objects of its analysis, classification, and induction, not merely the statements of Scripture, but the religious realities which those statements, as well as our own experience, make known to us.

Further, if a scientific character is to be vindicated for Progress in dogmatism, it must also accept the position of a variable and progressive study. This does not imply that nothing is certain within its domain, or that there must be a constant flux and reflux of opinion throughout its entire history. It is as much characteristic of science as it has certain well-established principles and results, which are not to be overthrown by any future inquirers, as that it is constantly advancing to further requirements and discoveries. Those who claim an absolutely fixed and unprogressive character for theology, though they may seem to do honour to its divine authority, really degrade it from the rank of a science; and if they retain any reverence for it at all, can only do so on the principles and in the spirit of Roman Catholicism. Thus Macaulay's brilliant statements to that effect, which are sometimes quoted by those who defend an immobile orthodox theology, imply as their basis either a contemptuous dismissal of theology altogether as a tissue of uncertainties, or a lurking belief that the one unchanging system is to be found in the faith of the Church of Rome. What has tended, and still tends very powerfully, to obscure the idea of progress in dogmatic theology is the want of a clear apprehension of the distinction between religion and theology, and the notion that the Bible is directly a revelation of theological dogmas, which need only to be correctly interpreted and arranged in logical order. If this were so, then we should be able at once to construct a complete system of theology, by simply applying the rules of grammar and logic to Scripture; and this could be done as correctly and well in the 2d century as in the 19th or 19th. There would be no room, or the very narrowest conceivable, for progress. In that case, then, if we are found that students dealing thus with Scripture came to widely different conclusions as to the system of doctrine to be drawn from it, we should be obliged to conclude that the revelation was not complete or unambiguous, and therefore that it must either be supplemented and checked by a living authority in the church to determine its true meaning, or that no certain knowledge in regard to doctrine can be attained. The former is the Roman Catholic, the latter the sceptical or anti-dogmatic alternative, but both alike proceed from the same premises, and indicate the imposibility of carrying them out without either giving up the practicality of dogmatic, or seeking it in an infallible church.

But this difficulty disappears when the Bible is regarded as a revelation, not solely or directly of doctrine, but of religion. On this view, it is the inspired record of the great historical events by means of which the religious fellowship of man with God has been established, and gradually elevated to its perfect form in Christianity, and

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1 Institutes of Theology, bk. ii. ch. 10. Ubi supra.
2 Syol. Thed., Intro. ch. i.
of the inward experience of that fellowship in a new life produced by a moral and spiritual renovation of the soul of man. Doctrines, or general principles bearing on the relation of God to man, are indeed contained in the Bible, but only as they are involved in the great realities that the Bible makes known to us. The Bible is to the theologian what the telescope is to the astronomer, or the microscope to the physiologist. Many of the laws of these sciences could not have been known without the help of these instruments,—not because the telescope discovers to us laws of astronomy, or the microscope enables us to see the principles of physiology, but because they bring within our ken the phenomena from which these laws and principles may be ascertained. So the Bible does not directly reveal dogmatic principles; but its function is to reveal to us that great work of renovation by God in Christ, from which the principles of Christian dogmatism are to be derived. On this view, while the Christian religion is ever one and the same, unalterable in all ages, Christian theology, or the scientific knowledge of that religion, is constantly progressive. All its truths are indeed contained implicitly in the Bible; but they have to be drawn from it, not by a mere process of interpreting and systematizing the words of Scripture, but by apprehending and experiencing the realities made known to us by the words, and so coming to understand what they are and in what relations they stand one to another. It is in this way that all the great doctrines in theology have been established,—not merely by the application of grammar and logic to the text of Scripture, but by the apprehension and experience of the renovating change, and the comparison and understanding of its different parts. So, for example, the doctrine of the Logos was formulated by men like Justin Martyr, who, after vainly searching for truth in all the schools of philosophy, found that there is in Christianity, when sincerely received, a light that dispels the darkness and doubt of the mind. So Augustine learned the doctrines of original sin and divine grace, by finding in his own experience the power of inward corruption on the one hand, and the deliverance wrought by the gospel on the other. So Luther discovered the truth of justification by faith, through learning by sore and bitter conflicts how impossible it was to find peace of conscience, as long as he trusted to any works of his own, and how fully he obtained it by faith in Christ. In this way the system of dogmatic has been built up, one doctrine after another being added, as it was discovered and verified by the experience of the church. None of these developments was any addition to the Christianity of true disciples of the Lord; that remains substantially the same in all ages, and contains implicitly all true doctrines of religion. But all Christians are not conscious of what is involved in their religion and experience, and some are very imperfectly aware of it. The men who have made their mark in theology have been those who have been led by circumstances, and enabled by their intellectual powers, to discern elements in Christian life not previously seen; and the body of the church, having at last found them, have verified and accepted the results of their experience. In this way dogmatic theology hitherto has been progressive, and no man or church has a right to say that the goal has been reached beyond which no further progress is possible.1

There is one condition always to be borne in mind, with which alone such progress is sound and genuine. It is that what is added to the system of doctrine be really an expression of the Christianity which is revealed in Scripture. Anything that is not such may be a fable of men, or an abnormal development of spiritual life, but it is not really a discovery of Christian truth. There have been opinions held and widely prevalent that are of this character, and it is part of the work of the theologian to detect and remove what is false as well as to build up what is true. There have been false developments of doctrine; there have been exaggerations and maladjustments of important truths. It is not probable that any minute and elaborate system consists of pure and absolute truths unmixed with any error. The work of progress in theology, therefore, must sometimes consist of undoing what has been laboriously built up in past ages. But if any true progress is possible now, it is not to be expected that all the old beliefs will have to be swept away, and an entirely new system put in their place. For if nothing had been ascertained in the course of the ages during which so many great minds have been directed to the study of theology, there would seem to be little hope of anything certain being discovered now. Those who think theology to be a progressive science can most comfortably the some progress has been made already, and some conclusions have been reached that are not to be overthrown by any new inquiries. They do not look for an entire reversal of old beliefs, and a new theory of the universe and its relation to God to be put in their place; they expect that what has been most generally agreed upon in former ages will be maintained and confirmed, and that any new truth that may be brought to light will fit in to the old foundations; though in some cases former modes of statement may have to be reconsidered and adjusted to larger and deeper views, and exaggerated or one-sided doctrines may have to be given up or modified. There are some doctrines in every system that are merely sectarian, adopted by one particular branch of the church, but not recognized by others as correct expressions of Christian faith and life, e.g., the Anglican dogma of baptismal regeneration, or the Lutheran tenet of the communication of attributes in the person of Christ, or the supralapsarian and sublapsarian theories of Calvinists; in regard to such points there is no just ground of confidence of their permanence; they are like plausible but unproved hypotheses in science. But there are many leading doctrines which, ever since they have been distinctly formulated, have been accepted by the vast mass of Christians in all branches of the church; these may be said to be established results of theological investigation, which no further progress of the science is likely to overth temporal confidentiality.

The progressive character of dogmatic, and the manner its progress in the past, may be seen from a brief sketch of its history from the end of the apostolic age to the present day. The apostolic writings themselves do not properly fall within the range of such a history; for they are of the nature of human science but of divine revelation. No doubt several of them present to us conceptions and trains of thought that are very analogous to the systems of later times, and have sometimes been employed as the basis of dogmatic systems. But the inspired writings do not stand in the same line as the thinkers who came after them; their aim in writing was not the scientific one of investigating the principles of Christianity in their mutual relations, but the more primary religious one of presenting Christianity itself to the world. This they have been enabled to do, by the working of the Spirit in them, with a power and fulness and insight that throw such light on the scientific study of Christian doctrine; but their writings are not doctrinal systems, and do not come into the line of the rise and progress of the human science of dogmatism. Its history begins with the attempts of men to comprehend the revelation of Christianity, and presupposes that revelation complete, thought not completely

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understood, as its starting point. From that point onward it may be regarded as passing through six pretty well defined periods or stages.

I. The first may be called the apologetic age, extending from the apostolic time to the death of Origen (254 A.D.), in whom it may be said to have culminated. During this period the intellect of the church was gradually awakening and coming into activity; but it was only by degrees, and in the course of several generations, that its efforts led to any properly doctrinal results. The very earliest Christian literature is simply practical and hortatory, chiefly in the form of epistles (Apostolic Fathers). From the middle of the 2d century, however, the need was felt of defending the church's faith against argumentative attacks, whether popular, literary, or philosophical. Hence the chief mental power of the Christian community was turned in the direction of "apologies," by which these attacks were repelled, and attention was directed mainly to the evidences of the truth and divinity of Christianity. Thus, however, indirectly led to the articulate statement of many of the most essential doctrines of Christianity, and to the beginning of a dogmatic system. The great apologetic question was generally and rightly conceived in the form of a search for some true and reliable teaching about God and divine things, and the Johannine idea of Christ as the light of the world, the Logos or Word of God, naturally occurred to the apologists as that which most exactly met the want. Thus the doctrine of the Logos, in some at least of its aspects, was brought out. Then in the conflicts with Gnosticism, which may be said to be as really apologetic as those with Judaism and heathenism, certain aspects of Christianity were very distinctly brought into consciousness, such as the creation of all things by God, the reality and divinity of Christianity. The great apologetic question was therefore gradually awakening in the church's mind, and coming into activity; but it was only by degrees, and in the course of several generations, that its efforts led to any properly doctrinal results. The very earliest Christian literature is simply practical and hortatory, chiefly in the form of epistles (Apostolic Fathers).

II. The second great period in the history of dogmatic, extending from Origen (who died 254) to John of Damascus (who died 744), is distinguished from the first by its being occupied mainly with controversies within the church, and thus may be called the polemic age. As the gospel spread more and more throughout the world, and gained the victory over paganism in the minds and hearts of the most enlightened of the day, the influence of Christianity against external assaults gradually ceased to be the all-engrossing duty of the church's theologians, and at the same time heresies so thoroughly and manifestly antichristian as those of the Gnostics ceased to have any prevalence among Christians, and other divergent views, of a less openly hostile nature, began to appear. As the doctrine of the Logos had been one of the first that the church was led to think out in the apologetic period, it not unnaturally became the point at which varying conceptions first came into conflict. On this, as on many other subjects, the Christian redemption is so full and many-sided that its entire contents could not be grasped at once and by all minds, or that some were led to accept some aspects of it more readily than others, and to give these an exaggerated predominance. Hence the progress of Christian thought to the right understanding of divine truth has been through a series of controversies and oscillations from one extreme to another. This process may be said to have begun about the middle of the 3d century, from which time to the end of the 7th there stretches a continuous series of controversies on questions relating to God and the Trinity, the incarnation and person of Christ, original sin, and regenerate grace. In the course of these, successive forms of opinion on these subjects were discussed, condemned, and stamped as heresies—such as the Sabellian, Arian, Apollinarian, Macedonian, Nestorian, Pelagian, Monophysite, Semi-pelagian, Monothelite doctrines. In sharp contrast with these opposing heresies, and sometimes in a narrow strait between them, the doctrine of the church was defined more and more precisely. As authoritative expressions of this doctrine we have the first six ecumenical councils, with the provincial ones in the West that condemned Pelagianism and Semi-pelagianism, and the creed of Nicaea (325) as enlarged and altered at Constantinople (381), with the decrees of Chalcedon (451) against Monophysitism, Orange and Valenta (529) against Semi-pelagianism, and Constantinople (1st Trullan, 680) against Monothelitism. This long series of keen and varied controversies on the loveliest doctrines represents a vast amount of intellectual activity in the field of dogmatic, and some of the greatest names in the church's history belong to this period. Athanasius, Basil, the two Gregories, the two Cyril, and Chrysostom in the East, and Ambrose, Augustine, and Hilary in the West, are but a few of the more outstanding and best known of the church's teachers during these controversies. On the whole it may be said that they have done their work satisfactorily and well, in establishing the true Christian view on the special doctrines they had to discuss; and the decisions of the church on these points have been very generally accepted in after times. The Reformers adopted either tacitly or expressly the whole body of them as in accordance with Scripture; and even in the immense upturning of opinions on all theological doctrines that has been going on in modern times, the faith of Nicaea has been maintained by the majority of theologians. Even the more detailed creed of Chalcedon is questioned by comparatively few, though the still more minute discussions and definitions after that have ceased to command the respect and interest of the modern church. But while the theologians of this polemic period were thus successful in establishing and defining some of the more important doctrines of Christianity, and by so doing contributed very valuable materials for dogmatic, they did little or nothing to produce a body of divinity in a scientifi...
of dogmatic propositions in his work Πρωτολογία, which remained for the Eastern Church the supreme authority in theology for a thousand years after. There has been, however, no living onward movement in the comprehension of Christian doctrine in the Greek Church; and if on this account that great section of the Orthodox, so called, is strictly so called, is usually reckoned to extend only from the 8th century to the middle of the 15th. But the times thought. The doctrines of the church were established from the 11th century to the middle of the 15th, and it was only until the 16th, though in after ages, though in its more distinct articulation than before,—particularly that of the atonement, by Anselm; and the keen and subtle analysis to which all doctrines and conceptions were subjected has produced many distinctions that have been found useful in later times as conducing to clearness of thought.

The decline and fall of scholasticism was due to the gradually awakening consciousness of the unsoundness of the principles on which it rested. The nominalistic controversy shook men's faith in the absolute identity of thought and being, reason and authority; and the identification of theology and philosophy came to an end. The latter refused to be any longer the mere handmaid of the church; and from the assertion of its freedom the history of modern philosophy dates. This was necessarily a fatal blow to the scholastic theology; and at the same time the great religious movement of the Reformation made a reconstruction of the system of church doctrine necessary.

IV. The age of the Reformation, occupying the greater portion of the 16th century, may be said to form by itself a fourth period in the history of dogmatic, for it was animated by a spirit that distinguishes it both from the preceding and from the following time. The Reformation was a movement too full of spiritual life and activity in many directions to be adequately described by any single phrase; but for the present purpose it may comprehensively enough be said to be the assertion of the principle of the direct and personal relation of the believer to God. This involved the sweeping away of all ecclesiastical authority and mediation, and the assertion of the sole authority of God's word and of justification by faith, which have been called the formal and material principles of Protestantism. This also necessarily brought with it a new conception of theology. Christianity was no longer a law, and saving faith was no longer the intellectual assent to certain doctrines; Christianity was a new life, offered in the gospel and received by the soul's trust (fides) in Christ. Hence, when the Reformers came, as some of the greatest of them did, to give a systematic statement of Christian doctrine, they not only rejected those tenets which had been held in the medieval church on no higher authority than that of tradition and ecclesiastical decisions, but they also found that they could exhibit a much more organic unity in the body of Christian doctrine, because they regarded it not as a necessary means or step towards spiritual life, but as the outcome and systematic presentation of that life which is obtained and preserved directly by faith in Christ. The great theological works of the Reformation age were not for the most part written purely in the interest of science or system, but for more practical purposes, for the defence of the new doctrines against attacks made upon them, or for the guidance of ministers in the practical teaching of the people. But it is nevertheless true that in these ways were produced works which had more of the symmetry and unity of a complete system than any that had previously appeared. This can only be accounted for by assuming that the Reformers had laid hold of the right principle of theology, and that the new life of the Reformation had carried them above and beyond the mistaken view of Christianity that had long been the predominant conception of dogmatic. The Loci Communes Theologicorum, Melanchthon (1st ed. 1521, final form 1550), and the Institution...
Religions Christianity of Calvin (1st ed. 1559, final form 1559), are the two chief systematic works of this period, and have formed the starting-points of the Lutheran and Reformed dogmatics respectively. The system expounded in them is summarily set forth in the several Protestant Confessions of this era, and various special doctrines were elaborated and defended by other leaders of the Reformation. The Reformers accepted the doctrinal statements of the ancient creeds and of the first four general councils as scriptural and true; they also adopted with great earnestness the Augustinian doctrines of grace, while they added to them the principle with which Luther's name is inseparably associated of justification by faith, and that of the supreme authority of the Bible as the rule of faith and life,—both of these being in their view witnessed and guaranteed by the testimony of the Holy Spirit. Maintaining these principles, they rejected the authority of the church, the multiplication and magical efficacy of the sacraments, the merit of good works, monastic vows, penance, purgatory, and other corruptions of the Middle Ages. In their hands theology lost the merely objective character that it had borne in patristic and medieval times, and was brought into closer connection with religious and Christian life, by the recognition and cultivation of its subjective side. The vital matter with them was, not to have right opinions about the Trinity and the hypostatic union, but to be sure of the true way of salvation by Christ. Their writings are pervaded by a warmth of spiritual life, as well as by a freshness of theological thought, that mark them as the genuine products of a creative age in the history of Christian doctrine. The Reformation age may be said to have closed with the final fixing of the Protestant doctrines in the generally-accepted symbolical books, which took place for the Lutheran church in the adoption of the Formula Consensus in 1580, and for the Reformed churches in the decisions of the Synod of Dort in 1618–19. Even earlier, however, a declaration may be observed from the lofty and free spirit of the first Reformers; and a somewhat different character began to mark the theology of both the branches of the Protestant church.

V. A fifth period in the history of dogmatics, which may be called the confessional one, extends from the beginning of the 17th till near the end of the 18th century. During this time the doctrinal systems, of which the foundations had been laid by Melancthon and Calvin, were elaborated and carried into details with great learning and acuteness; the various doctrines were most carefully and precisely defined, distinguished, and defended. The 17th century was an age of theological controversy. The Roman Catholic Church had recovered from the shock of the Reformation, and by the aid of the Jesuits and the powerful reaction inaugurated by them, had regained strength not only materially but intellectually. Controversialists like Bellarmine, Peterius, and Bossuet taxed the learning and ingenuity of Protestantism to meet them. There were also many less necessary and profitless controversies among Protestants themselves; and almost every theologian was led to devote his energy to the attack of what he held to be error, and the maintenance of true doctrine. Much valuable argument was brought into use in the course of these discussions, and the system of dogmatics was more fully worked out than it had been before. The great dogmatic works of the 17th century, such as those of John Gerhard, Calvius, Quenstedt, and Ewer in the Lutheran church, and of Francois Turrettini, Muentzer, and De Masto among the Reformed, are more minute, precise, and full in their exhibition of the doctrines of the faith than the writings of the Reformers, and they contain a great deal of vigorous and profound thought. Never probably have the doctrines which they handle been so ably and thoroughly discussed. They were, however, treated somewhat in the scholastic method that had prevailed before the Reformation. The theologians of the 17th century did indeed clearly perceive and firmly maintain the principle of the sole authority of Scripture, which was one of those involved in the revolt against the authority of the church and hierarchy of Rome. Hence, in point of matter, their systems are vastly superior to those of the schoolmen, freer from traditional and sacerdotal dogmas, and far more in harmony with apostolic teaching. But they failed to apprehend a deeper principle that was implicitly contained in the Reformation movement, viz., that Christian doctrine, instead of preceding Christian life as a necessary means to it, must come after its actual experience. Sound doctrine was regarded as the preliminary condition of spiritual life; and as it had thus to be established apart from the living experience of Christianity in the soul, it must rest on purely external authority. This was found in an extreme and one-sided view of the inspiration of Scripture, as equivalent to verbal or literal interpretation, and in an uncritical and indiscriminate use of proof texts from all portions of Scripture, without due regard to their historical connection and scope. These became to many of the divines of that age very much what the sentences of the fathers and councils had been to the schoolmen, and an undue weight was sometimes allowed to the apocryphal and canonical books in which Protestant doctrine had been expressed. An excessive subtlety and minuteness of definition were also often adopted, and when these were made matters of faith in different parts of the church, numerous schisms and separations took place. The rigid exclusiveness of the Lutheran divines on the basis of the Formula Concordiae, the intolerant zeal of the Anglicans for episcopacy and ceremonies, the extreme doctrinal minuteness of the Formula Consensus Ecclesiæ of 1675, and the narrowness of some of the English Puritans and Scottish Presbyterians are instances of this tendency, and the disastrous effects of many of these are well known.

The issue of this form of theology was very similar to that of the scholastic system. It was gradually undermined by the spirit of rationalism calling in question the validity of its minute definitions. This tendency had been active from the time of the Reformation in various forms, and though for long it was controverted and excluded from the Protestant Churches, in the course of the 18th century it brought about a general dismantlement of their dogmatics. It was found that there was not sufficient evidence to maintain the too minute and detailed systems of the 17th century, a more critical study of the Bible, and the orthodoxy that had rested on a insecure foundation was for a time almost entirely overthrown. In nearly all the churches there came, in various forms, an age of indifference and even unbelief in the old doctrines of the gospel; and this was generally accompanied with a declension in spiritual life. It was in Germany that the sceptical movement took the most pronounced form; and there, accordingly, the break with the theology of the 17th century has been most complete. In this country the triumph of rationalism has never been so absolute, and the transition to a new era in the history of theology has not been so marked.

VI. But a new period has undoubtedly come since the modern beginning of the present century. A reaction has set in against the rationalism that overthrew the older dogmatics. In some cases, indeed, this has taken the form of a simple reversion and re-establishment of the old systems of doctrine, as in the school of Hengstenberg, Havernick, Philipps, and others, who maintain the Lutheran orthodoxy in all its rigidity, and in many British and American divines, who reproduce the Calvinistic system in its precise 17th century form. But by many the need is felt of more thoroughly
The modern era of dogmatic may be said to have been opened by Schleiermacher's *Christliche Glaube* (1821), a work of great genius, learning, and power, which did good service in putting an end to the previously prevalent rationalism and bare scientific treatment of the dogmas. Schleiermacher exercised great influence on theological thought; and though he did not succeed in emancipating himself from the pantheistic principles of his philosophy, his mode of conceiving Christianity and its relation to theology has been fruitful of good results. By a large number of diverse theories, he has tried to be unusually free from systematic bases, as was practically done formerly, the whole system of theology on the one doctrine of the inspiration of Scripture; and a broader foundation, as well as a more living conception, has been sought for it, by recognizing as its subject-matter, not merely the sayings of Scripture, but that living Christianity which is the direct object of the Bible. This is really a taking up and carrying out more fully of the principles of the Reformation, and it is in this line that dogmatic seems to be cultivated with most prospect of success and stability. There is in the present day much confusion in this as in many other departments of theology, and system of the most diverse contents and on the most diverse principles are produced in abundance; but the line in which such men as Nitsch, Martensen, Julius Muller, Ebrard, Osterzec, Ritschi, and others have been labouring is that which in order to maintain the substance of what has been given in former ages, is free to welcome modifications and develop the more basically based principles.

Literature.—The literature of dogmatic is exceedingly rich and varied, and only the more important and influential works can be mentioned here. Before the Reformation, however, though there are many treatises of primary importance on particular doctrines, and though the more comprehensive works have an historical value, yet there is no complete system constructed on sound principles, so as to be of much direct use. Calvin's *Institutes* (Religio Christianae) is the first great work, embracing the whole subject, that is still of direct and primary importance. It is distinguished by a depth of insight into the principles of Christian doctrines, a comprehensive grasp and clear arrangement of their details, a reverence and sobriety in the interpretation and application of Scripture, and a spirit of Christian earnestness and purity that have never been surpassed. Of the later dogmatic systems in the Reform. of Church, some are brief compendia, among which the *Theologia Medulla* of William Ames, the English puritan, is specially distinguished for precision of thought and power of construction; others are much larger, and greatly exceed in the length and minuteness of their discussions the work of Calvin. Among them are Francis Turretin's *Institutio Theologiae Elenctica* (1679), remarkable for the logical power with which he maintains the strict Calvinistic doctrines on all the points involved in his dogma. Another great work is Peter Van Mastricht's *Theodicea Pratica Theologiae* (1685-97), is a favourable specimen of the Dutch theology of the time—learning, accurate, and at the same time profound. It was the first of the modern schools, as it is called, of dogmatic writers, and exercised great influence on the popular theology of this country, Hermann Witsius's *Christiana Doctrina* is a very able and suggestive production. The Arminian system is well represented by the *Theologia Christiana* of Philip Limborch (1668), a work written in a clear, biblical, and conciliatory style.

The Lutheran dogmatic works are even more colossal and voluminous than the Reformed, the greatest of them, John Gerhard's *Logi Theololicae* (1680-92), shows a spirit of purity, as well as great learning, exactness of thought, and logical skill. He occupies a middle position between the more rigidly orthodox such as Hutter and Calovius, and the so-called syncretism of Calixtus. Of the same general character are the *Institutiones Theologicae* of John Francis Buddeus (1724). A very fair idea of the contents of the Lutheran dogmatic works may be obtained from Schmitt's *Die Lehre von den dogmatischen Systemen der evangelisch-Lutherischen Kirche* (1853), which contains mainly of quotations from the old divines on the different doctrines of the system, and from Luther's *Compendium der dogmatik*. In this country no important systematic treatise on dogmatic as a whole appeared till the publication of Dr George Hall's *Lectures on Divinity* in 1831, a work distinguished for the clear and confident statement of doctrines and exposition of their evidence, though lacking somewhat in spiritual warmth. Dr Chalmers's *Institutes of Theology* (1849) have this last quality in a very high degree, and follow a moderate line in forming dogmatic links with Church experience than had been usual, but the system is very imperfectly filled up, and is marked more by brilliant and suggestive thoughts as splendidly illustrated, than by thorough and minute investigation.

**DOGWOOD** (according to Prior, Ang. Sax. *dal*, a brooch pin), the name applied to plants of the genus *Cornus*, of the natural order *Cornaceae* or cornels. The common dogwood, *prick-wood, skewer-wood, or so-called dogberry, *C. sanguinea*, is a shrub reaching a height of 5 or 9 feet, common in hedges, thickets, and plantations in Great Britain. Its branches are dark-red; the leaves egg-shaped, pointed, about 2 inches long by 1½ broad, and turning red in autumn; and the flowers dull white, in terminal cymes. The fruits are of a black purplish, are bitter, and one-seeded, and contain a considerable percentage of oil, which in some places is employed for lamps, and in the manufacture of soap. The wood is white and very hard. Bark of other species of the genus is used for making ladder steps, spool-work, skewers, forks, and other implements, and gunpowder charcoal. The red berries of the dwarf species, *C. sanguinea*, of the Scotch Highlands are eaten, and are reputed to be tonic in properties. *C. racemosa*, the Cornelian Cherry, a native of Europe and Northern Asia, bears a pulpy and edible fruit, which when ripe contains much tannin. It is the Akenia of the Greeks, and the Kizillik of the Turks; by the latter the wood is employed for giving a red dye. The bark of the handsome Flowering Dogwood, *C. florinda*, and of other American species, is valued as a stomachic and febrifuge, and is administered as a substitute for Peruvian bark. The Jamaic Dogwood, the root-bark of which is poisonous, is the species *Paeonia officinalis*, of the natural order *Paeoniaceae*.

**DOL** (a town of France, in the department of Ille-et-Vilaine, about 15 miles by rail from St. Malo, on an eminence in the midst of a marshy plain, protected from the inroads of the sea by a dyke of the 12th century, which extends for a distance of 22 miles. A quiet, sombre, agricultural little place, with nothing more remarkable in its modern life than the coin-market which is held in the old Carmelite church of Notre-Dame-sous-Dol, it preserves, in the remains of its ramparts and church, the memory of the time when it was one of the most important fortresses.
on the frontier between Brittany and Normandy. The streets are still rendered picturesque by the dark houses of the 14th and 15th centuries, which form deep arcades by the projection of their upper stories; and, high above all, in spite of its five hundred years, rises the grey granite of the cathedral, which formerly ranked as the metropolitan church of all Brittany, and still keeps fresh the name of that old Bishop St Samson, who, having fled, as the legend tells, from the Saxon invaders of England, selected this spot as the site of his monastery. To the architect it is interesting for the English character of its design, and to the antiquarian for its stained glass windows of the 15th century, its tombs, and its carvings. The town was twice besiegè by William the Conqueror, had three to defend itself during the wars of the League, and in 1590 witnessed the defeat of the republican forces by the Vendéens who had taken refuge within its walls. About a mile and a half from the town is the pierre du champ dolant, a menhir about 30 feet above the ground, not far off stands the great granite rock of Mont Dol, about 200 feet in height, and surrounded by the chapel of Notre Dame de l'Espérance, and about 10 miles to the south is the castle of Combourg where Chateaubriand spent his early days. Population in 1875, 3355.

DOLABELLA, PUBLIUS CORNELIUS, a Roman general notorious for his profligacy, was born about 70 B.C. His vicious character made itself apparent even in his early years. Before he attained his majority he is said to have been more than once guilty of capital crimes, from the punishment of which he was only delivered through the advocacy of Cicero. In the year 53 he forced his wife Fabia to leave him, and married Tullia, the daughter of Cicero, who strongly opposed the union. Dolabella's motive in establishing this connection was to prevent Cicero from giving evidence in favour of Appius Claudius, whom he had accused of having violated the sovereign rights of the people. In the following year, his numerous creditors having begun to clamour, he was forced to quit Rome, and betook himself to the camp of Caesar, to the great regret of his father-in-law. During Caesar's absence in Spain, Dolabella commanded the fleet in the Adriatic, but he did not gain any distinction. He took part in the battle of Pharsalus (48), after which he returned to Rome, in the expectation, delusive as it proved, that Caesar would give him a substantial reward for his services, and so enable him to pay his debts. To gain immunity from the urgent demands of his creditors, he procured his election to the tribunate, which he had no sooner done than he introduced a bill (proposito) proposing that all debts should be cancelled. This was strongly resented by his colleagues, and two parties were formed, between whom more than one bloody encounter took place in the streets of the city. On Caesar's return from Alexandria he saw the expediency of removing Dolabella from Rome, and accordingly took him as one of his generals in the expedition to Africa and Spain. Dolabella was ambitious of the consulship, and obtained a promise of it from Caesar for the year 44. The latter, however, influenced partly by the strong opposition of Antony, assumed the office himself, and deferred the fulfilment of his promise to Dolabella until he should set out on his expedition against the Parthians. The assassina-
tion of Caesar occurring before this arrangement could be carried out, Dolabella at once seized the insignia of the consulship, and, by making friends with Brutus and the other assassins, was confirmed in the office he had usurped. To ingratiate himself still further with the republican party, he caused an altar erected in honour of Caesar to be thrown down, and many of those who had sought to offer sacrifices on it to be crucified or thrown from the Tarpeian rock. He did not hesitate at once to change sides, however, when Antony made it his interest to do so by offering him the command of the expedition against the Parthians and the province of Syria. An unduly protracted and circuitous march was signalized by rapacious extortion, which became still more rapacious when at length Dolabella reached Syria. His crowning iniquity was the murder of Trebonius at Smyrna, which, according to Cicero's account, was preceded by two days' torture for the purpose of discovering the locality and amount of the treasure contained in the town. On hearing of this gross abuse of power, the senate outlawed Dolabella, and declared him a public enemy. Cassius was appointed to supersede him, proceeded to Asia Minor, and had taken Laodicea, when Dolabella in despair caused himself to be killed by one of his own soldiers, 43 B.C.

DOLCE, LUDOVICO, or LETI, (1580-1585 or 1569), one of the most laborious and multifarious writers of Italy in the 16th century, was a native of Venice, and belonged to a family of honourable tradition but decadent fortune. He received a good education, and early undertook the task of maintaining himself by his pen. He was destitute of outward events than such a life usually is, may be briefly summed up in one word,—he wrote Translations from Greek and Latin, epics, satires, histories, plays, and treatises on language and art followed each other in rapid succession, till the whole number amounted to upwards of 70 works. In his own day his industry was rewarded by no small amount of fame, but he is now mainly memorable as the author of Maratona, a tragedy from the life of Herod, which was recast in French by Tristan and by Voltare, and still keeps a place on the stage. Four licentious comedies, H. Rosso (1541), II Capitano (1548), II Marto (1560), II Ragazzo (1560), and seven of Seneca's tragedies complete the list of his dramatic efforts. In one epic—to translate the title-page,—"he has marvelously reduced into ottava rima and united into one narrative the stories of the Iliad and the Æneid," in another he devotes 39 cantos to a certain Frasuleto, son of Palmerio, in a third he celebrates the first exploits of Count Orlando, and in a fourth he sings of the Paladin Sacramonte. A life of the emperor Charles V and a similar account of Ferdinando I, published respectively in 1560 and 1566, are his chief historico-figurative productions; and among his minor treatises it is enough to mention the Observationes sulla lingua volgare, 1560, the Dialogo delle pittura, 1557, and the Dialogo nel quale si ragiona del modo di accrescere la memoria, 1553.

See Tiraboschi, Storia, etc., iv., Klein, Geschichte de Ürämaren, vol. v.

DOLCI, CARLO, or CARLINO (1616-1686), a painter of considerable celebrity, was born at Florence in May 1616. He was the grandson of a painter on the mother's side, and became a disciple of Jacopo Vignali; and when only eleven years of age he attempted a whole figure of St John, and a head of the infant Christ, which received extraordinary approbation. He afterwards painted a portrait of his father, and displayed a new and delicate style which brought him into notice, and procured him extensive employment at Florence from which he has disengaged himself, and in and other parts of Italy. Dolci used his pencil chiefly in sacred subjects, and bestowed much labour on his pictures in his manner of working he was remarkably slow. It is said that his brain was affected by seeing Luca Giordano, in 1652, despatch more business in four or five hours than he could have executed in as many months, and that he hence fell into a state of hypochondria, which compelled him to relinquish his art, and soon brought him to the grave. His works are not very numerous. He generally painted in a small size, although there are a few pictures by him as large as life. He died at Florence in January.
1686, leaving a daughter (Agnes), who arrived at some degree of excellence in copying the works of her father.

Dolci had somewhat the same rank in the Florentine that Sassoferrato does in the Roman school. Without the possession of much genius, invention, or elevation of type, both these artists produced highly wrought pictures, extremely attractive to some tastes. The works of Dolci are easily distinguishable by the drapery of the composition, and by an agreeable tint of colour, improved by judicious management of the chiaro-scuro, which gives his figures a striking relief; he affected the use of ultramarine, much loaded in tint. "His pencil," says Pilkington, "was tender, his touch inexpressibly neat, and his colouring transparent; though he has often been censured for the excessive labour bestowed on his pictures, and also for giving his caricatures more of the appearance of ivory than the look of flesh." All his best productions are of a devout description; they frequently represent the patient suffering of Christ or the sorrows of the Mater Dolorosa. Dolci was, in fact, from early youth, exceedingly pious; it is said that during passion week every year he painted a half-figure of the Saviour. His sacred heads are marked with pathetic or at least strongly sentimental emotion. There is a want of character in his pictures, but the general tone accords with the idea of the passion portrayed. Among the best works of this master are the St Sebastian; the Four Evangelists, at Florence; Christ Breaking the Bread, in the marquis of Exeter's collection at Burleigh; the St Celcis in Dresden; an Adoration of the Magi; and in especial St Andrew praying before his crucifixion, in the Pitti Gallery, his most important composition, painted in 1646; also several smaller pictures, which are highly valued, and occupy honourable places in the richest galleries.

DOLE, a town of France, at the head of an arrondissement in the department of Jura, 28 miles N. of Lons-le-Saulnier, occupying the declivity of a hill on the right bank of the Doubs, which is there accompanied by the canal of the Doubs, which is there accompanied by the canal of the Rhone and the Rhine. It is the seat of a tribunal of primary instance, and has a Jesuit college, an agricultural society, a school of design, a theatre, a museum, and a public library of upwards of 40,000 volumes. The principal public buildings are the court-house, originally a Franciscan monastery dating from 1572; the church of Notre Dame, a Gothic structure of the 16th century; the Hôtel-Dieu, the prison, the barracks, two hospitals, and the ancient tower of Vergy. Among the manufactures of the town are straw hats, bunsery, chemicals, leather, and agricultural implements; and it carries on a good trade in agricultural produce, wool, iron, and marble. Dole is believed to have been a station on the Roman road from Lyons to the Rhine, and it still preserves what seem to be remains of an aqueduct, a bridge, and a theatre, of Roman construction. From 1423 to 1481 it was the seat of a university; but there can have been but little study in the year 1479 when the town was taken by Louis XI, and so completely sacked that only Jean Vury's house, as it is still called, and other two buildings were left standing. It subsequently came into the hands of the Spaniards, and in 1530 was fortified by Charles V. In 1635 it was able to hold out against the prince of Condé; but in 1693 and 1674 it was captured by the French, and on the latter occasion was deprived of its defences. Till Besançon was incorporated with the province, Dole ranked as the capital of Franche Comté, and was the seat of a parlement.

DOLET, ÉTIENNE (1509-1546), a French scholar and printer, whose fame is due as well to the painful romance of his life as to the high intellectual tradition, of what authority it is hard to say, makes him the illegitimate son of Francis I.; and it is evident that he was at least connected with some family of rank and wealth. From Orleans, where he was born, he was taken to Paris about 1521; and after enjoying there the instruction of Nicolas Béraldus, the teacher of Coligny, he proceeded in 1526 to Padua. The death of his friend and master, Simon de Villanova, led him, in 1529, to accept the post of secretary to Jean de Languec, French ambassador to the republic of Venice; but he managed, in spite of his new occupation, to attend the lectures of the Venetian scholar Battista Egnazio, and to write Latin love poems to some Venetian Elena, who died, however, before he left the city. Returning to France in 1530 he proceeded to Toulouse for the study of law; but there he soon became involved in the violent disputes then raging between the different "nations" of the university, roused the anger of the public authorities by his keen condemnation of some of their measures, was thrown into prison, ran the risk of being assassinated, and was finally banished by a decree of the parlement. In 1535 he entered the lists against Erasmus in the famous Ciceronian controversy, by publishing, through Battista Gryphe at Lyons, a Dialogus de Ignatione Ciceroniana; and the following year saw the appearance of his two folio volumes Commentariorum Linguæ Latinae. In 1537 he obtained from Francis I. a privilege to print during ten years any works in Latin, Greek, Italian, or French which were the products of his own pen or had received his supervision; and accordingly, on his release from an imprisonment occasioned by his justifiable homicide of a painter Campanini, he commenced at Lyons his typographical and editorial labours. That he was not altogether unaware of the dangers to which he was exposed from the bigotry and fierce-heartedness of the times is shown not only by the tone of his mottoes—Prière mes, Seigneur, des colomnes des hommes, and Durior est spectare virtutem quam incognitam conditum—but also by the fact that he endeavoured first of all to conciliate the theological wolves by publishing a Cato christanus, or Christian moralist, in which he made profession of his creed. The Catholicity of his literary appreciation, in spite of his ultra-Ciceronianism, was soon displayed by the variety of the works which proceeded from his press—ancient and modern, sacred and secular, from the New Testament in Latin to Rabelais in French. But long before the term of his privilege expired his labours were interrupted by the machinations of his enemies, who neither shrank from bringing against him what was then the most terrible of all accusations, nor relented in their pursuit till their purpose was completely realized. From a first imprisonment of fifteen months their victim was released by the advocacy of Pierre Duchatel, bishop of Tulle; and from a second he escaped by his own ingenuity; but, venturing back from Piedmont, whether he had fled in order that he might print at Lyons the letters by which he appealed for justice to the king of France, the queen of Navarre, and the parlement of Paris, he was again arrested, hurried up to the capital, branded as a relapsed atheist by the theological faculty of the Sorbonne, and on the 3d of August 1546 put to the torture, strangled, and burnt in the Place Maubert. On his way thither he is said to have composed the punning pentameter—Non dolet ves Dolet, sed pia turba dolet. As if in prophetick mockery of their own proceedings, the doctors of the Sorbonne based their decision on the three words Rien du tout or "Nothing at all," inserted by Dolet in a passage of the Aetna of Plato, which even without them denied, if not so emphatically, the immortality of the soul; and this they did in spite of the fact that according to their own showing, his works must have been full of most damnable heresies, and could hardly have been a slender fuel to the hangman's fire. Whether Dolet is to be classed with the representatives of Protestantism or with the advocates of
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anti-Christian rationalism has been frequently disputed; by the principal Protestant of his own time he was not recognized, and by Calvin he is formally condemned, along with Descartes and his master, Robert Fludd. He having uttered excusable blasphemies against the Son of God, but, to judge by the religious character of a large number of the books which he translated or published, such a condemnation is altogether misplaced. His repeated advocacy of the reading of the Scriptures in the vulgar tongue is especially noticeable.

To the works already mentioned the following must be added—A volume published by Simon Fonet, without the author's knowledge, containing Gratiani in T totalmente divinum, emendatorum libri duo, novissimae versionis, and emendatorum aliorum libri, 1534; Du ius maris libri, 1537, De quibusdam Claudii Doleti, 1539 (a collection of Latin poems on the death of his son, translated into French as L'Amant-Vainqueur de Claude Dolet, 1539), La manière de bien traduire une langue in a langue, and De la ponctuation française, 1541; Le Manuel du Chef-Chanteur et le trompoy luy de si bien confusser, both translated from Erasmus's Latin, 1544; Bref Discours de la République française, 1544, Second Entier, 1545, a poem giving an account of events, "that was reprinted in 1560 by Techen. See Nee de la Rochelle, Vie d'Eustache Dolet, Paris, 1739; Joseph Boulanger, "Eustache Dolet," in the Revue de Paris, 1822, and a separate work, Eustache Dolet, sa vie, etc., Paris, 1857, A. F. Dole, Essais sur la Typographie de la presse ou trait de Dolet was published in 1839, by A. H. Trouayard from the registers of the University of Paris.

DOLGELLY, a market and assize town of Merionethshire, North Wales, situated at the junction of the Arian with the Severn, and at the northern base of Cadar Idris, 19 miles S. W. of Llanidloes, and 9 miles E. of Barmouth, with both of which it is connected by rail. The town consists of a series of small squares and narrow streets, the houses being built of stone. It contains a market hall, a hospital, county hall, and parish church. An old building, described as the Parliament House, is said to have been the place in which Owen Glendower assembled his parliament in 1404.

DOLMIEU, Didot-Guy-Sylvain-Tancrède Gratet (1750–1801), a celebrated geologist and mineralogist, was born at Dolomieu, near Tour-du-Pin, in the department of Isère in France, June 24, 1750. He was admitted in his infancy a member of the Order of Malta. When he was 15 years of age he squabbled with a knight of the galley on which he was serving, and in the duel that ensued killed him. In consonance with the statutes of his order, Dolomieu was condemned to death for his crime, but in consideration of his youth the grand master granted him a pardon, which, at the instance of Cardinal Thomas, confirmed by Pope Clement XIII, and after nine months imprisonment he was set at liberty. Throughout that period he had solaced himself with the study of the physical sciences, and during his subsequent residence at Metz he continued to devote himself to them. In 1775 he published his Recherches sur la pesanteur des corps à différentes distances du centre de la terre, and two Italian translations of mineralogical treatises by Cronstedt and Bergmann. These works gained for him the honour of election as a corresponding member of the Academy of Sciences at Paris to obtain leisure to follow his favourite pursuits. Dolomieu now threw up the commission which, since the age of fifteen, he had held in the cabaniers, and in 1777 he accompanied the baili De Rohan to Portugal. In the following year he visited Spain, and in 1780 and 1781 Sicily and the adjacent islands. Two months of the year 1782 were spent in examining the geological structure of the Pyrenees, and in 1783 the earthquake of Calabria induced him to go to Italy. The scientific results of these excursions are given in his Voyage aux îles de Lipar, Memoire sur le tremblement de terre de la Calabre; et catalogue raisonné des produits de l'Etna, and other works. In 1789 and 1790 he bade himself with an examination of the Alps, his observations on which form the subject of numerous memoirs published in the Journal de Physique. The mineral dolomite, which was named after him, was first described by Dolomieu in 1791. He returned to France in that year, bringing with him rich collections of minerals. On September 14, 1792, the Duc de la Rochefoucault, with whom he had been for twenty years on terms of the closest intimacy, was assassinated at Forges, and Dolomieu retired with the widow and daughter of the duke to their estate of Roche Guyon, where he wrote several important scientific papers.

The events of the 9th Thermidor (July 27, 1794) having restored the country to some tranquillity, Dolomieu recommenced his geological tours, and visited various parts of France with which he had been previously unacquainted. He was in 1796 appointed engineer and professor at the school of mines, and was chosen a member of the Institute at the time of its formation. At the end of 1797 he joined the scientific staff which in 1798 accompanied Bonaparte's expedition to Egypt. He had proceeded as far as Cairo when ill health made his return to Europe necessary, and on March 7, 1797, he set sail from
Alexandria. His ship proving unseaworthy put into Taranto, and as Naples was then at war with France, all the French passengers were made prisoners. On May 22, they were carried by ship to Messina, whence, with the exception of Dolomieu, they embarked for the coast of France. Dolomieu had been an object of the hatred of the Neapolitan court since 1753, when he revealed to the grand master of his order its designs against Malta, and the columns of his enemies on that island served now as a pretext for his detention. He was confined in a pestilential dungeon, where, clothed in rags, and having nothing but a little straw for a bed, he languished during 21 months. To the complaint that if unsupplied with some necessary he should die, his jailer replied, "What does it matter to me if you die? I have to give account to the king of nothing but your bones." Dolomieu, however, did not abandon himself to despair. Deprived of writing materials, he made a piece of wood his pen, and with the smoke of his lamp for ink he wrote upon the margins of a Bible, the only book he still possessed, his Traité de philosophie minéralogique et Mémoire sur l'espace minérale. Friends entreated, but in vain, for his liberty; it was with difficulty that they succeeded in furnishing him with a little assistance, and it was only by virtue of a special clause in the treaty between France and Naples that, on March 15, 1801, he was released. On his arrival in France he commenced the duties of the chair of mineralogy at the museum of natural history, to which, after the death of Daubenton, he had been elected in January 1793. His course of lectures concluded, he revisited Switzerland. Returning thence he reached the residence of his brother-in-law at Château-Neuf, in the department of Saône-et-Loire, where he was seized with a fever, to which in a few days he succumbed, November 25, 1801. Dolomieu’s geological theories are remarkable for originality and boldness of conception. The materials constituting the primordial globe he held to have arranged themselves according to their specific gravities, so as to have constituted a fluid central sphere, a solid crust external to this, next a stratum of water, and lastly the atmosphere. Where water penetrated through the crust, solidification took place in the underlying fluid mass, which enlarging in consequence produced rифes in the superincumbent rocks. Water rushing down through the rifts became decomposed, and the resulting effervescence occasioned submarine volcanoes.

The crust of the earth he believed to be continually increasing in thickness, owing to the deposition of aqueous rocks, and to the gradual solidification of the molten interior, so that the volcanic eruptions and other geological phenomena of former must have been of far greater magnitude and frequency than those of recent times.


DOLPHIN (Delphinus delphis), the common name of a species of whale belonging to the family Delphinidae. It usually measures from 6 to 8 feet in length, and is thickest near the centre, where the dorsal fin rises to a height of 9 or 10 inches, and whence the body tapers towards both extremities. The forehead descends abruptly to the base of the slightly flattened beak, which is about 6 inches long, and is separated from the forehead by a transverse depression. The mouth is armed with sharp, slightly curved teeth, of uniform size, varying in number from 40 to 50 on each side of either jaw, and those above locking exactly with the teeth below. The aperture of the ear in dolphins is exceedingly minute; the eyes are of moderate size and the nose-duct is crescent-shaped. The colour of the upper surface is black, becoming lighter on the flanks, and perfectly white on the parts beneath. Like many other cetaceans, the dolphin is gregarious, and large herds are often seen following ships in full sail, and displaying themselves on the surface of the water as if delighted at the near proximity of man. In such excursions they exhibit the most remarkable agility, individuals having been known to keep to such a height out of the water as to fall upon the deck. Their aquatic gambols and apparant relish for human society have attracted the attention of mariners at all ages, and have probably given rise to the many fabulous stories told of dolphins by ancient historians. Their appearance at sea was formerly regarded as a good omen by sailors, for although it presaged a tempest, yet by thus giving warning of its approach, it enabled them, in those days when the mariner’s compass was unknown, and navigators had consequently to keep within sight of the coast, to steer for a place of safety. The dolphin is exceedingly voracious, feeding on fish, cuttlefishes, and crustaceans. On the south coast of England it is said to live chiefly on piddock and mender, and when in pursuit of these it is often taken in the fisherman’s nets. The female brings forth a single young one, which she nurses with the greatest care. Her milk is both abundant and rich, and during the operation of suckling the mother floats in a slightly sading position, so as to allow of the necessary respiration in herself and her young. The dolphin was formerly supposed to be a fish, and as such was allowed to be eaten by Roman Catholics on those occasions when the use of flesh was prohibited, and it seems to have been esteemed as a great delicacy by the French. It is said to show great fondness for music, and according to the ancient fable, Arcn was said to have escaped on the back of a dolphin which he had first charmed by his music. It is an inhabitant of the temperate regions of the North Atlantic and the Mediterranean Sea, and has been observed as far north as the coast of Greenland. It is much more common in English than in Scottish waters. Among the seafaring population of Britain the name “dolphin” is most usually given to the beautifully coloured fish Coryphas io hippurus—the dorado of the Portuguese, and it is to the latter the poet is alluding when he speaks of “the dying dolphin’s changing hues”—while the true dolphin is usually spoken of as the “bottle-nose” or “bottle-head.” This species occurs as a fossil in the sandy downs of the French coast.

DOMAT, or DAUMAT, JEAN (1625-1696), a celebrated French jurisconsult, born at Clermont in Auvergne, on the 30th November 1625. He was closely in sympathy with the Port-Royalists, was intimate with Pascal, and at the death of that celebrated philosopher was intrusted with his private papers. He is principally known from his elaborate legal digest, in four volumes 4to, under the title of Lois Civiles dans leur Ordre Naturel Suivies du Droit Public (1689),—an undertaking for which Louis XIV. settled on him a pension of two thousand livres. This is one of the most important works on the science of law that France has produced. Domat endeavoured to found all law upon ethical or religious principles, his motto being L’homme est fait par Dieu et pour Dieu. An English translation of the Lois Civiles by Strahan, was published in 1722, and passed through several editions. Besides the Lois Civiles, Domat made in Latin a selection of the most common laws in the collections of Justinian. This work, however, did not appear until after his death, when it was published separately (Paris, 1700, Amsterdam, 1703) under the title of Legum Detectae, and was subsequently appended to the Lois Civiles. It was translated into English by Strahan. Domat died at Paris on the 14th March 1696.

See in the Journal des Savants for 1843 several papers on Domat by Victor Cousin, giving much information not otherwise accessible.
DOMBROWSKI, Jan Henryk (1755–1818), Polish general, was born at Pierzowice in the palantine of Cracow, August 29, 1755. He was of noble family, and his father was an officer in the Saxon army. Brought up in Saxony, he entered and for some years served in the army; but when, in 1791, the Polish Diet recalled all Poles serving abroad, he returned to his native land. Placed then under the orders of Pomatowski, he took part in the campaign of 1792 against the Russians. In 1793 he distinguished himself in command of the right wing under Kosciusko assisted in the defence of Warsaw, and reunited the scattered Polish forces after its fall. He was compelled, however, to capitulate and to surrender himself prisoner of war at Radzywycz, November 18. Swaroff offered him a post in the Russian army, but this he declined, and for two years he lived in retirement. In 1796 the rank of lieutenant-general in the Prussian army was offered to him by the king, but this he likewise declined. He then went to Paris. The formation of a Polish legion was at this time in contemplation by the French authorities, and in January 1797 Dombrowski was formally authorized by the Government of the Cisalpine Republic to organize it. Thus task he executed in Milan. In command of his legion he played an important part in the war in Italy, entered Rome in May 1799, and distinguished himself greatly at the battle of Trebiu (June 19, 1799). On this occasion he narrowly escaped death, being struck by a ball the force of which was broken by a volume of Schiller which he carried with him. He next served under Saint-Cyr and Masséna, but being severely wounded he was for some time incapacitated for action. After Marenco he was intrusted by Napoleon with the organization of two new Polish legions; and at the head of the new levies he captured, in January 1801, the fortified post of Casa Branca, near Peschiera. After the peace of Amiens he passed, as general of division, into the service of the Italian republic. Summoned by Napoleon after the battle of Jena to promote a rising in Poland, he returned there, took command of the Polish army, and distinguished himself at the siege of Daftunci (1807). He fought and was wounded at Friedland, and took an active part against the Austrians in the campaign of 1809. In the Russian campaign of 1812 he commanded a division of the great French army, and was wounded at the passage of the Beresina. He fought under General Marmont at the battle of Leipzig (1813), and in the following year returned to Poland. He was one of the generals entrusted by the emperor Alexander with the reorganization of that Polish army, and was made in 1815 general of cavalry and senator patuite of the new kingdom of Poland. He retired, however, in the following year to his estates in Posen, and employed himself in preparing for publication his History of the Polish Legions in Italy, which was published some years after his death. General Dombrowski died at his seat of Wina-Gora in Posen, in June or July 1818.

DOME is usually understood to mean a roof which is round or polygonal horizontally, and of which any vertical section in either a round or a pointed arch. There happen to be none of elliptical or any other section than these. But some, especially in the East, have what is called an ogival outline, convex below and concave towards the top, and these are generally called cupolas, though there is no real distinction. Most of the great European domes have an opening or eye at the top, on which stands a lantern, except in the Piazza del Duomo, where the eye is open. Until modern times all the domes worth notice were of masonry, i.e., stone, brick, tiles, or pots, which last were used for lightness. Probably the first large wooden dome was St Paul's, of which the construction is peculiar, the inner dome visible in the church being of brick only 18 inches thick, except near the bottom where it grows out of a cone of the same thickness going up outside it and carrying the stone lantern, which looks right down into the church through an eye in the internal dome. Outside the cone is built a wooden dome covered with lead. The domes of St Peter's at Rome and Florence Cathedral are of two stone shells near together, and connected by some vertical ribs, and also carrying lanterns. But Wren's construction is infinitely stronger, since a cone sufficiently tied at the bottom cannot give way until it is absolutely crushed, while the bursting pressure of a weight on the top of a dome increases the bursting force enormously. St Peter's dome is cracked in several places, and held together by bands, and it is covered with lead, and therefore looks no better than St Paul's, and indeed on the whole not near so well, for various reasons which may be seen in architectural books; and the lantern is smaller in proportion.

The only full mathematical investigation of the theory of domes with practical results, that we know of, is in a paper by Sir Edmund Beckett (then Mr Denison) in the Memoirs of the Royal Institution, in 1807, and two shorter ones by Mr E. T. T. Tenne, architect, in the Civil Engineer's Journal of March 1808, which substantially agree, so far as they deal with the same points. The investigation is long and complicated, and can only be done approximately, because the introduction of the thickness deranges all the ordinary trigonometrical relations, and so we only give the principal results of these calculations. Some more of them are given in Sir E. Beckett's Book on Building. It is easy to prove by strict mathematics that the upper 52° (nearly) of a hemispherical dome would be absolutely stable, or have no tendency to fall in or burst out, without any sensible thickness, if only tied strongly enough round the base, where the tension would be 3 of the weight of the complete hemisphere, disregarding the bonding effect of mortar and friction. The weight of a thin hemispherical shell is the same as that of a cylinder of the same height and thickness standing on the same base, and is twice that of the area which the dome covers, of the same thickness, provided that bears only a small proportion to the diameter. The weight of any zone of the dome is proportional to its height. A hemisphere of ordinary stone 100 feet wide at mid-thickness and 1 foot thick weighs about 1000 tons. It is also demonstrable that a dome spreading at the bottom a little more than a hemisphere, so as not to start vertically, and rather flattened at the top, would stand without any sensible thickness; and a dome would sungly stand, and especially an inverted cone, which will stand even as an independent arch without thickness, for a dome is far more stable than any arch or a barrel vault of the same thickness.

The essential difference between them is that the mathematical element of a dome is not an arch of any uniform breadth, but one whose breadth, and therefore weight, decreases upwards to nothing, being in fact a zone enclosed between two meridians very close together. And it was shown in the R. I. B. A. paper, and also by models exhibited, that a dome is stable with a thickness of only '025 of its diameter, while an independent round arch or a barrel vault requires three times as much thickness, or 312 times of its diameter. Therefore a barrel vault 100 feet wide must be 7 feet thick to be stable, while a dome of that diameter need only be 27 inches; besides which, the strength of the dome can be increased to almost any extent by building in iron bands in the lower courses, while a barrel vault cannot be so helped. Bands would be of no use whatever in a dome above 52° from the top, as the pressure above that point is entirely inward, assuming it to be tied there, and from thence it gradually increases towards the bottom, where the tension is '215 of the weight of the
hemisphere. It may seem paradoxical that it should be less than 65°; but the explanation is that the tension bears a higher proportion to the weight in a thin dome than a thick one, and it was an infinitely thin one which had the tension of 3° of its weight at 52°; and such a dome cannot be carried lower without bands. In a dome of the required thickness ties would have very little to do above 65°.

As the tension at the bottom is rather more than a fifth of the weight, a dome of proper thickness would be stable standing on a conical drum, with a slope inwards of about 1 to 6, or 12°, of which the tangent is 215, if the drum itself has foundations which cannot spread. The thickness requisite, and also the tension at the bottom, may evidently be greatly diminished by gradually tapering the dome upwards. If it is half as thick at the top as at the bottom, with the thickness increasing downwards as the height, it need only weigh \( \frac{3}{8} \) of the lightest uniform dome of the same size, and only need be 20 inches thick at the bottom for 100 feet diameter.

Pointed domes are also much stronger than hemispheres, having lost the flat top which has the greatest bursting pressure. A dome generated by the revolution of an equalateral arch, or one of 60°, requires a thickness only 0·137 diameter, or 16½ inches for 100 feet; and one of 70° requires 20 inches. The tension at the bottom of a 60° dome is only 15 of its weight, which weight, however, is 1·372 of a hemisphere on the same base, their heights being 1·73 to 1.

For the same reason pointed domes are fittest for carrying a lantern, but they are not so much benefited by tapering, having already lost the most oppressive part. The Florence dome, across the flat sides of the polygon, is about 70° of the circle of its curvature. It is shown in the R.I.B.A. paper that both in hemispherical and pointed domes the weight of the lantern they will carry varies practically as the cube of the thickness. Moreover a lanterned dome requires tuing much higher up than a plain one. In short, the cone is the only proper way of carrying a stone lantern. The cone at St Paul's has a great chain round the base, which is probably superficial, as the drum below it seems thick enough to contain the requisite slope, and visibly leans inwards beneath it.

Ribs inside a dome weaken more than strengthen it, as some persons imagine, unless they are themselves deep enough to be stable as independent arches, or unless they decrease in width and weight upwards like a lune, as those in the Pantheon do, which also is so enormously thick at the haunches that it has superbundant stability. Some of the Indian domes are thick enough for arches, and they have neither eyes nor lanterns. Polygonal domes may be considered as composed of a small number of wide lunes, and only differ from round ones in being rather weaker for any given thickness and size.

Domes require no wooden centring to build them on as arches do, until you get near the top, i.e., so long as each stone laid on the ring of stones below it will not slide inwards. And if they are notched to prevent sliding the whole dome may be built without centring. The dome of Monza, in Malta was so built in this century by a common mason, who, must, however, have been a man of genius. There would be no difficulty in building a dome of almost any size of bricks or stones, with the help of hoop iron in all the lower courses up to about 23° from the bottom, and then less up to 52°, and higher if it has to carry a lantern. There is no masonry dome in the world wider than 145 feet. But there have been several larger iron ones, with an easy piece of engineering, insomuch as iron has enormous tensile strength, while stone has very little, and mortar practically none; and all the calculations above mentioned assume the domes to be composed of narrow lunes having no lateral bond or tie; but on the other hand all the stones are assumed to go right through the thickness and not to be liable to crush at the edges. Building the lowest courses with horizontal beds, which some architects suggested, was shown to be exactly the opposite of what is mathematically required, as there would be nothing to prevent their sliding over each other, whereas the essence of dome-construction is that the lower courses should confine the upper. It is not however practically expedient to make the beds lean inwards so much as to involve acute angles of the stones, as such angles in stone will bear very little pressure. Brick domes over wells or tanks, which should always be round for strength, are usually built on mere mounds of earth for centring, and they are always of flat section, or only about the upper half of a hemisphere, and are consequently stable with very little thickness, as the earth round them forms a somewhat larger abutment.

The following inside diameters of the largest domes in the world are given in Sir E. Beckett's Book on Building. —

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<thead>
<tr>
<th>Vienna Exhibition</th>
<th>Foot</th>
<th>Rijepore, Gol Gomuz</th>
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<td>1882 Exhibition</td>
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<td>Albert Hall</td>
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<td>Milan, S Carlo</td>
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<td>Florence</td>
<td>158</td>
<td>St Paul's</td>
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<tr>
<td>Florence</td>
<td>138</td>
<td>Invalides, Paris</td>
<td>92</td>
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<td>St Peter's</td>
<td>137</td>
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DOMENICHINO, or DOMENICO, ZAMPIERI (1581–1641), the celebrated painter, born at Bologna on 21st October 1581, was the son of a shoemaker. The diminutive form of Christian name by which he is known indicates his short stature. He was placed, when young, under the tuition of Denis Calvart, but having been treated with great severity by that master, he left him, and became a pupil in the academy of the Caracci, under Agostino. Towards the beginning of the 17th century he went to Rome, at the invitation of his fellow-pupil and intimate Albano, and prosecuted his studies under Annibale Caracci. The faculty of Domenichino was slow in its development. He was at first timid and distrustful of his powers; while his studious, unremitting, and reserved manners were misunderstood by his companions for dulness, and he obtained the nickname of "the Ox" (Buio). But Annibale Caracci, who observed his faculties with more attention, predicted, that the apparent slowness of Domenichino's genius would in time produce what would be an honour to the art of painting. When his early productions had brought him into notice, he studied with extreme application, and made such advance as to raise his works into a comparison with those of the most admired masters of the time. From his acting as a continual censor of his own works, he became distinguished amongst his fellow-pupils as an accurate and expressive designer; his colours were the truest to nature; Mengs, indeed, found nothing to desire in his works, except a somewhat larger proportion of elegance. Thus he might devote his whole powers to the art, Domenichino shunned all society; or, if he occasionally sought it in the public theatres and walks, it was in order better to observe the play of the passions in the features of the people—those of joy, anger, grief, terror, and every affection of the mind—and to commit them vividly to his tablet; thus says Bellori, it was that he succeeded in delineating the soul, in colouring life, and calling forth heartfelt emotions, at which all his works aim. In personal character he is credited with temperance and modesty; but, besides his want of sociability, he became somewhat suspicious, and jealous of his master.
Assumption thou art teaching me.' So novel, and at the same passion, using threatening words and that of Domenichino. powerful illustration of this truthful expression. two works of these masters, Annibale and procured an engraving of this master's picture of the same subject (now in the Gallery of Bologna), copies of which were circulated for the purpose of showing up Domenichino as a plagiarist. There is in truth a very considerable resemblance between the two compositions. The pictures which Zampieri painted immediately afterwards, representing subjects from the life of St Cecilia, only increased the alarm of his competitors, and redoubled their injustice and railing. Disgusted with these cabals, he left Rome for Bologna, where he remained until he was recalled by Pope Gregory XV., who appointed him principal painter and architect to the pontifical palace in this architectural post he seems to have done little or nothing, although he was not unskilled in the art. He designed in great part the Villa di Baldevere at Frascati, and the whole of the Villa Ludovisi, and some other edifices. From 1630 onwards Domenichino was engaged in Naples, chiefly on a series of frescoes (never wholly completed) of the life of St Januarius in the Cappella del Tesoro. He settled in that city with his family, and opened a school. There the persecution against him became far more shameful than in any previous instance. The notorious so-called ' Cabal of Naples'—the painters Corenzio, Liberti, and Caracciolo,—led together as they were to exclude all alien competition, plagued and decried the Bolognese artist in all possible ways; for instance, on returning in the morning to his fresco-work, he would find not infrequently that some one had rubbed out the performance of the previous day. Perpetual worry is believed to have brought the life of Domenichino to a close; contemporary suspicion did not scruple to speak broadly of poison, but this has remained unconfirmed. He died in Naples, after two days' illness, on 15th April 1641.

Domenichino, in correctness of design, expression of the passions, and simplicity and variety in the airs of his heads, has been considered little inferior to Raphael; but in fact there is the greatest gulf fixed between the two. Critics of the last century adulated the Bolognese beyond all reason or foundation; he is now not only by the western countries, Wilton, Burne-Jones, and invention, lacking any innate ideality, though undoubtedly a forcible, resolute, and learned executant. "We must," says Lanzi, "despair to find paintings exhibiting richer or more varied draperies, details of costume more beautifully adapted, or more majestic mantles. The figures are neatly disposed both in place and action, conducing to the general effect; whilst a light pervades the whole which seems to rejoice the spirit, growing brighter and brighter in the aspect of the best countenances, whence they first attract the eye and heart of the beholder. The persons delineated could not tell their tale to the ear more plainly than they speak it to the eye. The Scourging of St Andrew, which he executed in competition with Guido at Rome (a fresco in the church of San Gregorio), is a powerful illustration of this truthful expression. Of the two works of these masters, Annibale Caracci preferred that of Domenichino, who is said that in painting one of the executors the artist actually brought himself into a passion, using threatening words and actions, and that Annibale Caracci, surprised him at that moment, embraced him, exclaiming with joy, 'To-day, my dear Domenichino, thou art teaching me.' So novel, and at the same time so natural, it appeared to him that the artist, like the otor, should feel within himself all that he is representing to others." Domenichino is esteemed the most distinguished disciple of the Caracci, or second only to Guido. Algarotti preferred him to the great masters; and Nicolo Passale considered the painter of the Communion of St Jerome to be the first after Raphael. His pictures of Adam and Eve, and the Martyrdom of St Agnes, in the Gallery of Bologna, are amongst his leading works. Others of superior interest is his first known picture, a fresco of the Death of Adonis, in the Loggia of the Querini Farnese, Rome, the Martyrdom of St Sebastian, in Santa Maria degli Angeli, the Four Evangelists, in Sant' Andrea della Valle; Diana and her Nymphs, in the Borghese Gallery; and the Assumption of the Virgin, in Santa Maria di Trastevere. His portraits are also highly reputed. It is admitted that in his compositions he often borrowed figures and arrangements from previous painters. Domenichino was potent in fresco. He excelled also in landscape painting. In that style (in which he was one of the earliest practitioners) he composed a whole of the figures, giving them much public adoration as any of his other performances. (W. M. R.)

DOMESDAY BOOK, or simply DOMESDAY, is, in its commonest use, the name applied to the Liber Gulielminianus, or Exchequer Domesday, a very ancient record containing a survey of all the lands of England, made in the time of William the Conqueror. It consists of two volumes—a greater and a less. The first is a large folio, written on 362 double pages of vellum, in a small but plain character, each page having a double column. Some of the capital letters and principal passages are touched with red ink, and some have strokes of red ink run across them, as if scratched out. This volume contains the description of the following counties:—Kent, Sussex, Surrey, Southampton, Berks, Wilts, Dorset, Somerset, Devon, Cornwall, Middlesex, Hereford, Bucks, Oxford, Gloucester, Worcester, Hereford, Cambridge, Huntingdon, Bedford, Northampton, Leicester, Warwick, Stafford, Salop, Cheshire, Derby, Notts, York, and Lincoln, together with the anomalous districts of Rutland and the land "inter Ripam et Mer- sham." The second volume is in quarto, written upon 450 double pages of vellum, but in a single column, and in a large but very fair character. It contains the counties of Essex, Norfolk, and Suffolk. This second volume, together with the Exon Domesday, which contains the fuller reports of the western counties, Wilton, Burne-Jones, Scenery, Devonshire, and Cornwall, and the Inquisitions Elenensia, which relates to the lands of the abbey of Ely, seems to be the original record of the survey itself, which appears in the first volume of the Exchequer Domesday in an abridged form. "In both volumes of the Exchequer Domesday," writes Mr Freeman in his History of the Norman Conquest, "each shire is commonly headed with a list of the chief landowners in it. The king comes first, then the great ecclesiastical, and then the great temporal propinquus, followed in many cases by the smaller proprietors lumped in classes 'servantes regis,' 'tani regis,' 'elemosynarii regis,' and the like, the list being numbered, and forming an index to the survey itself, which follows. Lastly, in several shires come the 'Clamores,' the records of lands which were said to be held unjustly, and to which other men laid claim. Then follows the survey itself. The lands of the king or other landowner are arranged under the hundreds in which they were placed, and the necessary particulars of which the survey was to be a record are put down under each manor or other holding. The northern shires are not described in the survey.
thumberland, Cumberland, Westmoreland, and Durham are conspicuous by their absence. Lancashire does not appear under its proper name; but Furness and the northern part of the county, as well as the south of Westmoreland, with a part of Cumberland, are included within the West Riding of Yorkshire. That part of Lancashire which lies between the rivers Ribble and Mersey is subjoined to Cheshire; and part of Rutland is described in the counties of Northampton and Lincoln: The reasons which led to the omission of these northern counties from Domesday are not difficult to be understood. Durham and Northumberland had been laid waste by the merciless hand of conquest. The devastations of the Conqueror himself in the winter of 1069-1070, the various invasions of Malcolm, and the vengeance taken by Odo after the murder of Bishop Walcher in 1080, must have left very little in those districts worth the surveying. Lancashire did not then exist as a separate county. Cumberland and Westmoreland had no being as English shires,—their southern portions then formed part of Yorkshire, and they are surveyed in Domesday as such; whilst their northern portions did not become part of the kingdom of England till the reign of William Rufus, having been held by the Scottish kings as a fief ever since the grant by Edmund the Magnificent, on the final overthrow of the old kingdom of Strathclyde. The notion that the northern portions of Cumberland and Westmoreland were conquered in 1072 by William L is derived from a careless blunder in the work of Matthew of Westminster, who has confounded William Rufus with his father.

The exact time of the commencement of this survey is variously stated. The Red Book of the Exchequer has been quoted as fixing the date at 1086, whereas the Red Book merely states that the survey was undertaken at a time subsequent to the total reduction of the island to the authority of the Conqueror. From the memorandum of the commission of the survey at the end of the second volume, it is evident, however, that Domesday was finished in 1086. Matthew Paris, Robert of Gloucester, the Annals of Waverley, and the Chronicle of Bernondyke give 1083 as the date of the record; Henry of Huntingdon places it in 1084; the Saxon Chronicle in 1085, Simeon of Durham, Florence of Worcester, Roger Hoveden, and Hennynford in 1086, whilst the Epistola Neustria and Diceto state 1087 as the year.

The reason given for taking this survey, as assigned by several ancient records and historians, was that every man should be satisfied with his own right, and not usurp with impunity what belonged to another. But besides this, it is stated by others that all lands who possessed landed estates now became vassals to the king, and paid him so much money by way of fee or homage, in proportion to the lands they held. According to the false Ingulphus, the survey was made in imitation of the policy of Alfred, who, at the time he divided the kingdom into counties, hundreds, and tithings, had an inquisition taken and digested into a register, which was called, from the places in which it was deposited, the Roll of Winchester. But the compilation of such a survey in the time of Alfred may be more than doubted; for, with the exception of the statement of Ingulphus, no chronicle alludes to the existence of this register, nor is any mention of it to be found in the records of the time or in those of a subsequent period. Had it been extant in the century immediately preceding the Norman Conquest, it would have prevented the necessity of giving those minute descriptions of land so common among the later of the Saxon charters. Again, the separation of counties is known to have been a division long anterior to the time of Alfred. The confusion in all probability has arisen from a similarity in the title of the two works. The survey of the Conqueror was called Domesday Book; the register of Alfred had the name of Domes-boc; but the Domes-boc, instead of being a territorial analysis as is Domesday Book, was in reality the code of Saxon laws.

For the execution of the survey recorded in Domesday Book, certain commissioners, called the king's justices, were sent into every county and shire, and juries summoned in each hundred, out of all orders of freemen, from barons down to the lowest farmers. These commissioners were to be informed by the inhabitants, upon oath, of the name of each manor and that of its owner, also by whom it was held in the time of Edward the Confessor; the number of hides; the quantity of wood, of pasture, and of meadow land; how many ploughs were in the demesne, and how many in the tenanted part of it; how many mils and how many fish-ponds or fisheries belonged to it; the value of the whole in the time of King Edward, as well as when granted by King William, and at the time of this survey; and also whether it was capable of improvement or of being advanced in value. They were likewise directed to return the tenants of every degree, the quantity of lands then and formerly held by each of them, what was the number of villains or slaves, and also the number and kinds of their cattle and live stock. These inquisitions, being first methodized in the county, were afterwards sent up to the king's Exchequer. So minute was the survey, that the writer of the contemporary portion of the Saxon Chronicle records—"So very narrowly he caused it to be traced out that there was not a single hide or yardland, not an ox, cow, or hog that was not set down."

By the completion of this survey the king acquired an exact knowledge of the possessions of the Crown. It afforded him the names of all the land-holders; it furnished him with the means of ascertaining the military strength of the country; and it pointed out the possibility of increasing the revenue in some cases and of lessening the demand of the tax-collectors in others. It was, moreover, a register of appeal for those whose titles to their property might be disputed. So accurate has Domesday Book been considered that its authority was never permitted to be called in question; and when it has been necessary to distinguish whether lands were held in ancient demesne or in any other manner, recourse was always had to Domesday, and to it only, in order to determine the doubt. From this definitive authority, from which, as from the sentence pronounced at Domesday, or the Day of Judgment, there could be no appeal, the name of the book is said to have been derived. Stowe indeed assigns another reason for this appellation, namely, that Domesday Book is a corruption of "dowus Dei book," a title given it because heretofore it was deposited in the king's treasury in a part of the church of Westminster or Winchester called domus Dei; the name, however, is plainly English. From the great care formerly taken to preserve this survey, we may learn the estimation in which it was held. In the Dialogus de Scaccario it is said, Liber utile (meaning Domesday) sigilli regis comes est indicibus in theatrio. It was formerly kept at Westminster with the king's seal by the side of the Tally Court in the Exchequer, under three locks and keys, in the charge of the auditor, the chamberlains, and deputy-chamberlains of the Exchequer, till in 1686 it was deposited among other valuable records in the chapter-house. It is now carefully preserved beneath a strong glass case in the Public Record Office, and can be consulted without payment of any fee.

Various local Domesdays exist, as those of York, Norwich, Ipswich, Chester, and Evesham. The most notable among them is in all probability the Domesday of St. Paul's, made in 1181 by the Dean, Ralph de Diceto, and edited by Archdeacon Hale.
In 1783 Domensay Book was published in two volumes, and in 1816 a volume of indices was printed by the Record Commission, to which a very valuable "general introduction was prefixed." During the latter year another volume appeared, containing the Eastern Domensay, and the Liber Numerarius Eleniensis, already noticed; the Westmon Domensay, comprising lands in Winchester between 1107 and 1128, and the Boldon Book, or Survey of the Palatinate of Durham in 1183. Within the last few years the whole of Domensay has been issued in parts, each part comprising a county, and printed by the process of photozincography, under the scholarly superintendence of Mr W. B. Sanders, one of the assistant keepers of the Public Records.


DOMICILE, in law, may be defined generally as the place of a man's permanent abode; but a precise definition of the word is a matter of acknowledged difficulty. Its use in jurisprudence is to fix the legal rights of a person in certain cases where it is used to apply to the law of the country to which he owes allegiance on the one hand, or of the country in which for the moment he happens to be, would be attended with inconvenience. Thus an English citizen who, for purposes of business, health, &c., has for many years permanently resided in France, has, let us suppose, died during a casual visit to Denmark. The question would arise under which of the three systems of law — English, French, or German — the validity of his will, the succession to his estate, &c., would be determined. Or, again, a French subject habitually resident in England, but not naturalized, might sue for a dissolution of his marriage in the matrimonial courts of this country, and it would be generally admitted that our courts in such a case were entitled to exercise jurisdiction, and that their decision ought to be received as determining the status of the persons concerned, just as fully as if they had been natural-born subjects of the Crown. In such cases there is a general agreement that a man's legal character, so to speak, should be determined by his domicile, rather than by his political nationality or his residence for the time being. We shall notice briefly the conditions of residence under which domicile may generally be established.

The Roman jurists defined domicile to be the place "ubi quis larem rumque se fortunam summam constituit: ut etiam eadem cum in loco suo adhuc absens sed pro/pfestus est, peregorni mil/det: quo a reddit peregorni jam destitit." The general result of the definitions to be found in writers on the civil law is to make that place the domicile which may be described as the head quarters of the person concerned, or, as it is expressed in the Code Civil, "la loci ou il a son principal etablissement." But here characteristic difficulties are the civil lawyers: a man's habits of life might point equally to two places as his head-quarters. It might be impossible to say which of them was the principal seat of his business. Which of the two in such a case is the legal domicile? Or can the same person at the same time have two domiciles? The two essential things are residence and the intention of remaining. Story's definition is, "That place properly the domicile of a person in which his habitation is fixed without any present intention of removing therefrom." Change of residence not intended, but a person's permanent residence would not create a new domicile. Cases will readily suggest themselves in which the question of intention may be surrounded with difficulties.

The following summary follows the general rules laid down by Story for determining the domicile of a person (Conflict of Laws, sec. 46). The child takes the domicile of the father, except in the case of an illegitimate child, which takes the domicile of the mother. Minors follow the changes of the father's domicile, and a married woman follows the domicile of her husband. The place of residence is prae para factum. and if a person removes to another place with the intention of making it his permanent residence, that place becomes his domicile. When a person has removed to another place with the intention of remaining there for an indefinite time, that is his domicile, though he may have a general intention of returning at some future time. In general the domicile of a married man is the place where his family permanently resides, even though he habitually transacts his business elsewhere. When a married man has two places of residence, that will be his domicile "which he himself selects or describes or deems to be his home, or which appears to be the centre of his affairs, or where he votes or exercises the rights and duties of a citizen." An unmarried man's domicile is where he transacts his business or exercises municipal duties or privileges. The domicile is therefore fixed by the intention of the individual. A domicile once established remains until a new one has been acquired, but ambassadors resident in a foreign country retain their domicile of nationality.

To these general rules may be added some of the principles laid down in recent cases by the English courts. The distinction between the question of domicile and that of naturalization or allegiance is clearly pointed out in Haldane v. Eckford (Law Reports, 8 Equity, 631) where it is said that to effect a change of domicile it is not necessary that a man should do all in his power to divest himself of his original nationality (sacer patriamus), it being sufficient that there should be a change of residence of a permanent character voluntarily assumed. And in Udny v. Udny (Law Reports, 1 House of Lords, Scotch Appeals) Lord Westbury said: "To suppose that for a change of domicile there must be a change of natural allegiance is to confound the political and civil status, to destroy the distinction between patrim and domicilium." So the lord chancellor: "A man may change his domicile as often as he pleases, but not his allegiance." In the British empire, composed as it is of communities having each its own system of law, there may be innumerable domiciles under one allegiance. In the first of the cases above mentioned the question was as to the domicile of a testator, whose domicile of origin was Scotch, who was a servant of the East India Company for thirty-three years, and who on leaving India went to Jersey, where he lived continuously for twenty-five years till his death. The Scotch domicile reverted on his leaving India, but was held to have been lost by the residence in Jersey, where a new domicile was acquired. This is a fair sample of the cases which frequently arise in British courts on the question of domicile. In the second of the cases mentioned above it was held to be "a settled principle that no man shall be without a domicile, and to secure this the law attributes to every individual as soon as he is born the domicile of his father, if the child be legitimate, and the domicile of his mother, if the child be illegitimate. This is called the domicile of origin, and is involuntary. It is the creation of the law, not of the party. It may be extinguished by act of law, as for example by sentence of death or exile for life, which destroys the status civile of the criminal; but it cannot be destroyed by the will and act of the party. Domicile of

1Some Roman jurists, however, maintained that a man might be without any domicile at all, as for example when he has definitely abandoned his old domicile, and is travelling in search of a new home. It is said that, when a domicile different from that of birth has been acquired and is abandoned, the domicile of birth revests the moment the other is given up. "The native domicile easily revests."
choice is the creation of the party. When a domicile of choice is acquired, the domicile of origin is in abeyance, but is not absolutely extinguished or obliterated. When a domicile of choice is abandoned, the domicile of origin revives, a special intention to revert to it not being necessary. A natural-born Englishman may domicile himself in Scotland, paying occasional required to create domicile of origin. The testator making only domicile, lived law of their domicile, rights in conformity abandonment of the contrary to that domicile not be acted in England, and resided not be valid or acquired, the testator's domicile was Scotch. The intention required to create a new domicile is an intention to settle in a new country as a permanent home, and this is sufficient without any intention to change civil status. In another case (Brunel v. Brunel, 12 Equity, 298), where a French subject had established himself in business in England, and resided there continuously for thirty years, making only occasional visits to France, but had refused to take out letters of naturalization on the ground that he might return to France, and would not give up his status as a French citizen, it was held, notwithstanding, that he had lost his domicile of origin, and had acquired an English domicile.

The effect of domicile on the rights and duties of parties is even more difficult to state Continental jurists draw a distinction between personal and real laws—the former being supposed to fix the legal character of the person and accompany him wherever he may be, the latter dealing with things only. In matters covered by the former, therefore, the domicile prevails; while things are governed by the law of the place in which they are. If the distinction were maintainable it would still be of little use in fixing the extent of the operations of the law of domicile, because one large class of real laws, that dealing with moveables, is universally admitted to be governed by domicile; while a large but undefined class of personal laws would certainly not be acted on by foreign states, e.g., where the law of domicile fixes with incapacity persons professing a religion contrary to that established by the state. There is no uniformity of practices or opinion on this point in modern jurisprudence. Story considers the following to be the best established principles in England and America on the point of personal capacity or status:—

1. The capacity, state, and condition of persons according to the law of the testator's domicile, will generally be regarded as to acts done, rights acquired, and contracts made in the place of their domicile touching property situate therein. If valid or invalid there, they will be valid or invalid everywhere. 2. As to acts done, etc., in other countries touching the property therein, the law of such countries, as to capacity, etc., and not the law of domicile, will generally prevail. Thus "in questions of minority or majority, competency to marry, incapacities incident to coverture, guardianship, emancipation, and duties and disabilities of the donee or grantee, etc., etc., the law of the domicile is applicable."

The operation of the law of domicile is most free from doubt in questions touching personal or movable property. Real property is governed by the lex loci, but personal property has in law no locality. On this point English law is now substantially in harmony with Continental jurisprudence. The principle that personal property is subject to the law of the owner's domicile is fully recognized in the distribution of the estate of a person deceased, whether with or without a will. The capacity of the testator is to make a will, the validity of the will, and its effect, are to be determined by the law of his actual domicile in the case of movable property. In the case of real property, on the other hand, these questions must be decided by the law of the country in which it is situated. It was doubted by Story whether a will valid according to testator's domicile at the time of its execution would be affected by a subsequent change of domicile. A recent case (Lynch v. Government of Paraguay) decided that personal property in England is governed by the law of testator's domicile at the time of his death. In this case the testator, a domiciled Paraguayan, died leaving personal property in England; and between his death and the application for probate of a decree of the Government of Paraguay declared that all the property of the deceased, wherever situate, was the property of the state of Paraguay. The court, nevertheless, held that the property in England must be governed by the law of Paraguay as at the time of the death (2 Probate and Matrimonial Cases, 268). So, when the law, says Story, was that the domicile of the intestate at the time of his death governed his personal property everywhere. The persons entitled, the proportions in which they are to take, etc., must be settled by the law of the domicile, however different that may be from the law of the country in which the goods are.

The following statutes relating to the effect of domicile on wills were passed in 1861:—

24 and 25 Vict. c. 114. Wills made out of the United Kingdom by British subjects (whatever may be the domicile of such person at the time of making the same or at the time of death) shall, as regards personal estate be held to be well executed, if the same be made according to (1), the forms required by the law of the place where the same were made, or (2), the place where such personal estate was domiciled when the same were made, or (3), the laws in force in that part of her Majesty's dominion where he had his domicile of origin. Wills made by any British subject (whether in his domicile shall, as regards personal estate, be well executed if they are according to the forms then required in that part of the United Kingdom in which they are made. No will or other testamentary disposition shall be held to be revoked or become invalid, nor shall the construction thereof be altered by reason of any subsequent change of domicile."

29 and 25 Vict. c. 121 recites that by the operation of the law of domicile the expectation and belief of British subjects dying abroad with regard to the distribution of their property are often defeated, and enacts that when a convention has been made between
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Her Majesty and any foreign country, it may be declared and shall be declared, that no British subject dying in such country shall be deemed to have acquired a domicile therein, unless he has been resident in such country for one year previous to his death, and has made a declaration in writing of his intention to become domiciled, and British subjects so dying without having so resided and made such declaration shall be deemed for all purposes of testate or intestate succession as to movables to retain the domicile possessed at the time of going to reside in such foreign country. Similar exemptions are conferred on the subjects of foreign states dying in British India. But the Act does not apply to foreigners who have obtained letters of naturalization in any part of Her Majesty's dominions.

DOMINIC, Sr, founder of the Dominican order of monks, was born at Calahorra, a village of Old Castile, in 1170. His family name is said to have been Guzman, an illustrious name connected with many of the most honourable families in Spain. Little is known of his father and mother, but in the mediæval legends his birth is surrounded with portents indicative of his future greatness. His mother dreamed she gave birth to a boy with a torch in his mouth, which, as she put it to the world in fire. At his baptism a new sign was given. A starry radiance encircled the baptismal font. His followers delighted to recognize a similar radiance in his countenance, which drew all hearts to him. His childhood gave evidence of his future devotion and self-scrern. He used to creep from his bed and prostrate himself on the hard boards. At seven years of age he quitted the paternal home for the house of his uncle, who was a churchman, and gave him his first lessons in divine things. At fifteen he went to the university of Salamanca, afterwards translated to Salamanca, where it attained the most famous university in Spain. He applied himself to letters and philosophy, but above all to theology,—opening his mind, according to one of his biographers, to the true knowledge, and his ears to the doctrines, of Holy Scripture. Two stories are told of him at this time, showing the intensity of his character, and indicating the future zealot in behalf of religion and the church. He sold his clothes to feed the poor in a time of famine, and, to a woman who complained that her brother had been made a slave by the Moors, he offered himself to be given in exchange. His career as a student is obscure. He appears to have remained at the university for about ten years, and it is only in 1195, when he was twenty-five years of age, that he begins to emerge into notice. He is then one of the canons of Osma, under the guidance of a new and zealous bishop, whose heart was full of extending the power of the church and reforming its abuses. He gradually became known by his fervour as a preacher and the severity of his austerity, although it was still nearly ten years later before the opportunity came for him to show his true character and abilities. In 1203 the bishop of Osma was delegated to negotiate the marriage of Alphonso VIII of Castile with a Danish princess, and for this he undertook a journey to Denmark with Dominic as his companion. Accustomed to the obedience and reverence everywhere paid to the clergy in Spain, a very different spectacle presented itself to them as soon as they crossed the Pyrenees. He found them in the plains and cities of Languedoc. There a new spirit—half poetical and half spiritual—had sprung up in opposition to the church. The Provençal poets found much of their inspiration in a prevailing excitement at the worldly vices and corruptions of the clergy, as well as in the chivalric loves and lusts of their time. Had in addition to the poets there had arisen in this interesting and beautiful country multitudes of preachers of a new, more simple, and more liberal faith. Peter de Bruyes and Henry the Deacon became the organs of popular indignation against the superstitious observances which the priests everywhere encouraged,—the worshipping of the cross, transubstantiation, prayers, aims, and oblations to the dead, and even infant baptism,—for, as in all such cases of popular movement, the church was attacked not merely in its abuses but in its essential rites and its very existence. The "Poor Man of Lyons" rejected the whole church system, and permitted women to officiate at the altar. The "Paulicians," a sect of Manicheans surviving from the 5th century, had spread from the East through the Greek provinces of Sicily and Italy, and settled amongst the other elements of disturbance in the south of France. "It was discovered," as Gibbon says (c. 54), "that many thousand Catholics of every rank and of either sex had embraced the Manichean heresy;" and the flames consumed twelve canons of Orleans supposed to be tainted with the heresy. The same vassalages of martyrdom and revenge as had been displayed in the East were repeated in the 13th century on the banks of the Rhone." The result of all was a state of heretical insurrection and confusion sufficiently startling to men like St Dominic or even St Bernard, who had left us a description of what he himself observed. "Christians without Christ, holy places denied to be holy, the sacraments no longer sacred, and holy days without their solemnities." (Quoted by Milman, Hist of Latin Christianity, iv 178.)

In such a country, and in such a state of things, St Dominic found his mission as a champion of the church and a preacher of Catholic truth. Painfully impressed by what he saw on his journey to Denmark, he was so aroused by the spectacle of abounding heresy on his return that he resolved to devote himself to the conversion of the inhabitants, and the revival of the church in a land which appeared to him so given over to evil. The Pope had sent legates thither for the correction and repression of the heretics, but after a year's labours they had met with no success, and were on their way back to report the failure of their mission at Rome. Dominic met them on his journey, and, struck at once by their splendid retinue and their failure, he exclaimed,—"How can you expect success with all this secular pomp? These men cannot be touched by words without corresponding deeds. The heretics deceived them by their simplicity. You must throw aside all your splendour, and go forth, as the disciples of old, barefoot, without purse or scrip, to proclaim the truth." He acted without delay on his own principle, and betook himself to the profession of a mendicant preacher. Even the legates were shamed for a time to follow in the wake of the new movement. But their enthusiasm did not last long, and Dominic was left alone in his self-denying labours. It is difficult to describe with any fidelity the character of St Dominic's career, which his medieval biographers have enveloped in a haze of miraculous exaggeration. Apparently at first he confined himself in the main to moral and intellectual influences, preaching against the heretical errors, and inviting the heretics to conferences and reasonings. His modern biographer, Lacordaire, has even ventured to compare this early phase of his work with St Paul's conferences with the Jews, and St Augustine's expostulations with the Donatists and Manicheans. His arguments were of course powerfully enforced by miraculous tokens when otherwise likely to fail of their purpose. Wherever he moved the glory of the supernatural marked him. Signs and portents, most of them too trivial and absurd for mention, gave emphasis to his preaching and triumph to his mission. But withal the success that awaited him as a preacher was disappointing; and the flames of war, kindled by the growing antagonism of the sects and the church, and fomented by the rival apostles which are always at hand to make use of the fury of religious passion, soon swept over the country, and hid from
view the figure of the missionary and the preacher. It was, as Milman says, a stubborn generation, which, besides preaching, and miracles, needed the sword of Simon de Montfort to cure it of its heresies. The atrocious crusade known as the Albigenian war, the violent incident and picturesque display of character on both sides, the pleasant, vociferating, and humiliated Count Raymond, the intrepid and bloodthirsty Montfort—these belong to history rather than to the life of Dominic. What part he really played in the war evades clear historical judgment. Did he share in its atrocities, as religious zealots in similar cases have often done, or did he mourn the interruption of his peaceable labours of conversion, and preach moderation to the conquerors, as well as penance to the heretics? Facts fail us in the matter. All that is known is that he remained through all the friend of De Montfort, and obeyed the call to bless the marriage of his son and the baptism of his daughter. This implies that the darker features of the crusade, and the conduct of its leader, awakened no such horror in him as they ought to have done; and when this is added the glory of this claim of Montfort of instituting the Holy Inquisition, the light which is thus thrown upon his character is far from pleasing. It is in no spirit of apostolic mildness, certainly, that he at last left the country in 1217, after the death of De Montfort. For many years," he says, "I have spoken to you with tenderness, with prayers, and tears, but, according to the proverb of my country, where the benediction has no effect the rod may have much. Behold now we raise up against you princes and prelates, nations and kingdoms, and many shall preach by the sword. This was a poor gospel for a people already desecrated by the armies of the church, and the preacher of it was certainly no apostle of peace. Full of enthusiasm, of eloquence, of dogmatism, with a genius for composition and the great power of inspiring devotion, his followers, Dominic fails in the higher virtues of patience, magnanimity, reasonableness, and moderation. He is a prince of the church, but not a saint in its official calendar.

On leaving Languedoc Dominic repaired to Rome, and spent the remainder of his life in the organization of his order, which received the papal sanction in 1216, and which, under his generalship, had extended in the course of five years throughout most of the countries of Europe. He died at Bologna in 1221, in the fifty-first year of his age. See DOMINICANS.

DOMINICA, in French DOMINIQUE, a British West India island, the largest in the Leeward group of the Lesser Antilles, lying between the French islands of Martinique and Guadeloupe, 34 miles north of the former and about the same distance south of the latter, at the intersection of 15° 30' N. lat. by 61° 30' W. long. It has a length of 29 miles with a maximum breadth of 16, and its area is estimated at 291 square miles. The longer axis is formed by a chain of mountains, which attains in some parts a height of upwards of 6000 feet, and gives the whole island a strongly marked profile and great irregularity of surface. The results and symptoms of volcanic activity are abundant, in the shape of sulphurars, emissions of subterranean vapours, and hot springs; and in the southern part of the island there exists a boiling lake of unascertained depth, in which the water is frequently projected 3 feet or more above the surface by the force of the ebullition. Besides a large number of minor rivulets, upwards of thirty streams of considerable size might be mentioned, and this abundance of natural irrigation develops great fertility in the rich volcanic soil. The hills are in many parts covered with trees, and the better trees of the kind commonly found in the West Indies; and the sugar-cane, coffee, cocoa, cotton, hудigo, oranges, plaitans, and arrow-root are grown in the lowlands. The island is botanically remarkable for the great number of peculiar species which it possesses in comparison with the poverty in this respect of Guadeloupe, Martinique, Montserrat, and Antigua: as many as 24 are mentioned by Grisebach. Game is abundant; the fisheries on the coast are productive; and large quantities of honey and wax are furnished by the wild bees, which were originally introduced from Europe. The coasts of the island are not much indented, and the only anchorage of importance is Prince Rupert's Bay and Roseau, both on the west side. The total tonnage of the ships that annually enter and clear amounts to 18,018 tons, according to the average of the fifteen years from 1850 to 1874 inclusive; and of this total only 3743 tons belong to foreign vessels. The imports in 1874 were valued at £56,714, and the exports of the same year at £67,720,—being a decrease since 1860 of £11,057 and £12,738 respectively. Since 1872 Dominica has formed part of the colony of the Leeward Islands, and sends its representatives to the general legislative council; but at the same time it retains its local governor or president, a separate treasury, and its local legislature, consisting of seven elective members and seven nominees of the crown. In 1874 its public revenue amounted to £218,022, its expenditure to £217,456, and its debt to £4813. In common with the Virgin Islands it has attained complete religious equality by the abolition of the salaries paid from the public funds to the clergy of the Church of England, who had a much smaller proportion of the population under their jurisdiction than the Roman Catholic priests. Of the Carib aborigines there are no representatives; and the present inhabitants, numbering, according to the census of 1871, 27,178, consist mainly of descendants of the former negro slaves, with a certain number of Spanish and English families. The capital is Roseau, or Charlotteville, a fortified port near the southern end of the island, with about 5000 inhabitants. Dominica was so named on its discovery by Columbus in 1493, in commemoration of the date, which happened to be Sunday (Domimca) the 3d of November. It was ceded to England by France at the Peace of Paris in 1763, was captured by the French in 1778, regained by the English in 1783, again seized by the French in 1802, and finally surrendered to Britain in 1814. It was in the neighbouring sea that Rodney obtained his victory over Count de Grasse in 1782.

DOMINICANS, the name by which the disciples of St Dominic became known. The Dominican order was founded, as stated in the article on the founder, in 1216 by a bull of Honorius III. It conformed to the general rule of the Augustinians, but further embraced a rule of absolute poverty or mendicancy, in addition to the usual vows of chastity and obedience. Its members were supposed to be exclusively devoted to preaching and public instruction, and were described as mendicant or preaching friars. The order held its first chapter in the year 1220 at Bologna, under the presidency of the founder. It adopted as its insignia within the cloister a white robe and hood, to which it added outside a black cloak, hence the popular name of black friars by which the Dominicans became known in England. The novitiate was for a year, and candidates were mainly recruited from the schools founded by the order, which became the nurseries of great preachers and great theologians. The order speedily extended itself through the whole Christian world, and popes, cardinals, and learned doctors sprang from it in numbers. Its preachers and teachers addressed all classes, inveighed "the high places of the human intellect," and were soon found, as Missal says, disputing in the universities of Italy and Germany, in Cologne, Rome, and Oxford. Before long they were to claim two of the
greatest luminaries of the prevalent philosophy, Albert the Great and Thomas Aquinas."

DOMINIUS, MARC ANTONIO DE (1565-1624), celebrated as a theologian and natural philosopher, was born at the island of Arbe, in 1566. He was educated in the order of the Jesuits at their college at Loreto, and afterwards studied at the university of Padua. He was employed for some time by the Jesuits as a teacher of rhetoric and mathematics, but he did not join the order. In 1596 he was appointed to the bishopric of Segovia, and in 1602 he was raised to the archbishopric of Spalatro. His endeavours to reform the church soon after made him obnoxious to the papal authorities, and he was compelled to leave his native country. Having become acquainted with Bishop Bedell, whilst the latter was chaplain to Sir Henry Wotton, ambassador from James I. at Venice, he communicated to that prelate his treatise *De Republica Ecclesiasticata*, which was afterwards (1617, 1620) published at London, with Bedell's corrections. The main argument of the work was directed against the supremacy of the bishop of Rome to other bishops. He came to England with Bedell, where he was received with great respect, and preached and wrote against the Roman Catholic religion. In 1619 he published at London Father Paul's *History of the Council of Trent*, with a dedication to King James. He was favourably received by the king, who bestowed on him the deanery of Windsor and other ecclesiastical preferments. But on the promotion of Pope Gregory XIV., who had been his school-fellow and old acquaintance, he was deluded by Gondomar, the Spanish ambassador, into the hopes of procuring a cardinal's hat, and thus of proving an instrument of great reformation within the church. Accordingly he returned to Rome in 1622, recanted his errors, and was at first well received; but he afterwards wrote letters to England recanting his recantation, and, these being intercepted, he was imprisoned by Pope Urban VIII., and died in 1624.

There were suspicions that he had been poisoned. Being convicted of heresy after his death, his body was exhumed and burned, and the ashes were thrown into the Tiber. He is believed to have been the first to promulgate a true theory of the rainbow in a tract *De radiis visus et lucis in astris perspectivis et tride* (Venice, 1611).

DOMITIAN (82-96). Titus Flavius Domitians, the second son of Titus Flavius Vespasianus and Flavia Domitilla, twelfth of the Caesars, and third of the Flavian dynasty, was born at Rome, 24th October 52 A.D. He enjoys an evil prominence as the only tyrant among the succession of good and just princes from the line of Augustus. According to Suetonius, he was brought up in squalor and ignorance, and led a degraded and miserable youth; but it is hardly credible that so good a prince and so indulgent a father in all his other acts should thus have neglected his son's education, and the story of his scandalous youth was more probably invented to suit his after life. When Vespasian was proclaimed emperor, Domitian escaped with difficulty from the burning temple of the Capot, and lay in hiding from the Vitellians till his father's party proved victorious. After the fall of Vitellius he was saluted as Caesar, or prince imperial, by the troops, obtained the city prefectship, and was intrusted with the administration of Italy till his father's return from the East. Intoxicated by this sudden rise from obscurity, he grossly abused the power committed to him, and conducted himself more like a Turkish pasha than the son of a sturdy Sabine soldier. Such were the airs of superiority he assumed that Vespasian, as the story goes, wrote in irony to thank him for not having disowned his own father. Certain it is that though in his father's lifetime he several times filled the office of consul, and after his death was nominally the partner in the empire with his brother, yet he never took any part in public business, but lived in great retirement, devoting himself to a life of pleasure and of literary pursuits till he succeeded to the purple. The death of Titus, if not hastened by foul means, was at least eagerly welcomed by his brother. His succession (13th Sept. 91) was unquestioned, and it would seem as if, when his ambition was sated, and before his fears were aroused, he intended, as far as his weak volitions and mean abilities would allow, to govern well. Like Augustus, he attempted a reformation of morals and religion. As chief pontiff he inquired into the character of the vestal virgins, three of whom were found guilty, while in the case of one the awful penalty of a living entombment was revived. He enforced the laws against adultery, mutilation, and the grosser forms of immorality. He forbade the public acting of minnes. He erected many temples and public buildings and restored the temple of the Capitol, on the galling of which, if Plutarch is to be believed, he expended 12,600 talents, or nearly two and a half millions of our money. He passed many sumptuary laws, one of which is noticeable as showing the increasing dearth of Italy. He was born at Rome, and like the latter emperors, was declared to be the son of a god. His birth was celebrated with great respect, and preached and written by the wasteful and inefficient process of slave labour. An edict was issued forbidding the withdrawal of arable land from the plough, and reducing existing vineyards by one half. Finally, he took a personal share in the administration of justice at Rome, and exercised a jealous supervision over the governors of provinces.

Such public virtues counterbalanced in the eyes of the people all his private vices, gross and glaring as they were from the first. Former emperors had been deified after their death, but Domitian was the first to arrogate divine honours in his lifetime, and cause himself in public documents to be styled *Our Lord and God* Doubless in the poet (such as Martial, who calls the emperor's name the *Ganymede of our second Jove*) this designation was nothing but fulsome flattery, but in the case of the provincials it was a sincere tribute to the impersonation of the Roman Empire, as the administrator of good government, and the peacemaker of the world. Even when Rome and Italy felt his heavy hand, and smothered beneath his proscriptions and extortion, the provincials were undisturbed. Though he took the title of emperor more than twenty times, and enjoyed at least one triumph, his achievements as a general were insignificant. His campaign in 33 against the Chatti was "a mere summer promenade;" in Dacia (87) he received a severe check, and the peace concluded with this nation in 90 was due to the victories of his lieutenant Vespasianus. Juvenal hints that the flaxen-haired Germans who figured in his triumph were purchased slaves. His jealousy was provoked by the successes of Agricola in Britain, and the conqueror of Galgacus and the hero of the battle of the Grampians was recalled to Rome (84) in the midst of his conquests, condemned to retirement, and, as Tacitus is inclined to believe, removed by poison.

The revolt of Antonius Saturninus, the commander of the Roman forces in Upper Germany (93), marks the turning point in his reign. By a fortunate march of the Rhine, which prevented his barbarian allies from coming to his assistance, and by the valor of Norbanus, it was speedily crushed, but the fears of the emperor once aroused seem never again to have slept. A proclamation as bloody as that of Sulla followed, and no man of eminence could feel his life safe. Before this he had sought out victims to gratify his cupidity and replenish his exhausted treasury. Now he struck at all that was conspicuous for talent or virtue, glutted himself with the blood of the Lanni, and sentenced to death his own cousin and nephew by marriage, Flavius Clemens. A conspiracy among his freedmen—set on foot, it is said, by his wife, who knew her own life to be threatened—cut short his career of tyranny and
bloodshed. He was stabbed in his bedroom by a freedman of Clemens named Stephanus, 18th Sept. 96. Had Demetian died after a short reign as his brother he might have left behind him as far a name, and the interesting problem for the historian is to connect the two portions of his reign, and account for the double part he played. Like Hamlet he was born to a question which he felt himself unequal to fill. So long as there was popular cause which he inherited from his brother lasted, and he felt himself secure on his throne, he carried on the traditions of his father's government, denounced delators, and administered even justice. After his unsuccessful campaign and the conspiracy of his general, he was seized with the common disease of absolute monarchs, the fear of assassination and distrust of all around him. The last three years of his reign witnessed the awful spectacle of the acts of a madman endowed with unlimited power.

DON, anciently Tanais, a river of European Russia, which ranks immediately after the Volga and the Dnieper. It rises in the Ivan lake, a small basin in the government of Tula, which also sends a portion of its waters to the Volga by means of the Shat, a tributary of the Upa; its course has a general southern direction through the governments of Rusan, Tamboff, Oroff, Voronesh, and the Country of the Don Cossacks; its total length, inclusive of its various tributaries, is 1355 miles; and its drainage area is calculated at 170,000 square miles. The Ivan lake lying 588 feet above the level of the sea, the average fall in the river is about 53 inches to the mile. In the upper division of its course, which may be regarded as extending to the confluence of the Voronesh, the Don flows for the most part through a low-lying and fertile country, though in the government of Rusan its banks are rocky and steep, and in some places become even precipices. The strata which it traverses belongs to the Devonian formation. In the middle division, or from the mouth of the Voronesh to the point where it makes its nearest approach to the Volga, it cuts its way to the S E; for the most part through Cretaceous rocks, which in many places rise on either side in steep and elevated banks, and at intervals encroach on the channel. After passing Kachalinskaia it turns to the S W, and maintains this direction till it falls into the Sea of Azoff, the first part of this division being still in the Cretaceous formation, but the latter part lying in an Upper Tertiary district. A short distance below the town of Rostoff it breaks up into several channels, of which the largest and most southern retains the name of the river, while the others are known respectively as the Mervi Donets, the Mokroga, Koloucha, and the Staraya Kuterma. Before it receives the Voronesh, the Don has attained a breadth of from 500 to 700, or even in a few places 1000 feet, while its depth varies from 4 to 20 feet; by the time it has reached its most eastern point, the depth has increased to from 7 to 80 feet, and the ordinary breadth to from 700 to 1000 feet, with an occasional maximum of 14,000 feet; in the lowest division the depth is frequently 70 feet, and the breadth in many places 1860 feet. Shallow reaches are not uncommon, and there are at least seven considerable shoals in the south-western part of the course. The river can be used for rafts as far up as the confluence of the Scoura; it becomes navigable after the addition of the Voronesh and has four regular stations for traffic at Vilkoff, Pavloff, Masloff, and Mamon, in the middle part of its course; but partly owing to obstructions of the channel, and partly to the scarcity of ship-timber in the Voronesh government, it does not attain any great importance as a means of communication till reaching the Terek, which takes place at Akasi, where it remains open on the average 250 days in the year, at the mouth of the Medveditza for 239, and at Novo-Cherkassk for 246.

DON COSSACK COUNTRY (in Russian, Donskogo Vostochnaia Zemlya, the Land of the Don Army), the south-west portion of European Russia, situated in the basin of the Don, and bounded in part by the Sea of Azoff. Its area, according to the military survey, is 59,650 square miles, or 135,761 square verst, but according to Schweizer 62,574 square miles, or 142,401 square verst. The coast of the river consists of an irregular steeper broken in some places by undulating elevations or small hills, and traversed by the channels and ravines of the numerous tributaries and sub-tributaries of the principal river. The district to the north is especially flat, forming in fact, as is shown by the characteristics of its flora, a part of the great Aralo-Caspian depression. Cretaceous formations appear throughout the whole “country,” Tertiary and Carboniferous formations especially to the south of the Donetz. Coal and anthracite are found in considerable abundance in several places, and iron ore occurs near the Mius, the Donets, and the Khoper. Limestone, chalk, and slate are common; and salt is obtained from various lakes. The upper soil is in general black earth, the subsoil usually clay. Agriculture is still in a backward state owing to the military prejudices of the Cossacks; but the virgin fertility of the ground, and the proximity of such seaports as Taganrog and Rostoff conduct greatly to its development. Wheat is the most generally cultivated cereal, but rye is largely black earth, the subsoil usually clay. Agriculture is still in a backward state owing to the military prejudices of the Cossacks; but the virgin fertility of the ground, and the proximity of such seaports as Taganrog and Rostoff conduct greatly to its development. Wheat is the most generally cultivated cereal, but rye is largely grown in the northern and millet in the southern districts. Flax and hemp have been introduced, and maize is sown in the gardens. Stock-rearing is extensively prosecuted; in 1860 there were about 373,000 horses, 991,000 cattle, and 2,242,000 sheep. The horses show a mixture of various Asiatic strains, those of the southern districts being the best. The cattle are usually of Calmuck or Tatar race, but sometimes of Hungarian or Dutch; and the sheep are, with slight exception, Russian, Calmuck, or Wallachian. The land of the Don Cossacks was divided in 1802 into the following seven districts—Cherkessk, First Don, Second Don, Ust-Medveditzki or Mouth of the Medveditza, Khoper, Donets, and Mamon; and in 1806 a new district, or obouz, was formed of the nomading Calmucks. The six first-mentioned are divided into stanitzas, to each of which belongs a definite territory; the Mius district is occupied by regular landholders; and the Calmucks are arranged according to hundreds, or setsnia. The population in 1859 of the whole Zemlya was 996,870, and in 1857, 1,010,135. Novo-Cherkassk is the seat of government and the residence of the directing officer of the Don army. In ancient times the Greeks had a colony at Tanais on the Sea of Azoff, and
various factories on the Don; and the Scythians and Sarmatians nomadized throughout the district. Afterwards came the Alans, the Huns, the Bulgarians, the Avars, and the Kazaras, the last even building the small town of Sarkel; then followed the Pechenegs, the Polovans, and finally the Tatars, whose power was gradually diminished during the 16th and 17th centuries by the encroachments of the Russian Cossacks.

DON JUAN, a legendary personage whose story, originating in Spain, has found currency in various poetic and dramatic forms throughout most of the countries of Europe. The character has a certain historic basis in so far as it is localized at Seville in the time of Peter the Cruel, or, according to another version, of Charles V. Don Juan, who belonged to the illustrious Toreno family, lived a life of unbridled licentiousness. In an attempt to abduct Girald, daughter of the governor of Seville, he was encountered by her father, whom he subsequently killed in a duel. In mocking defiance of the spirit world, in whose existence his sensuality had destroyed all faith, he visited the tomb of the murdered man in the vault of San Francisco and challenged his statue to follow him to supper. The invitation was accepted; the animat ed statue appeared at table among the guests, and burned the blasphemous sceptic to hell. In a few later dramatic versions of the story some features are introduced belonging to another personage of the same name, Don Juan de Marana, who, having sold himself to the devil, passed the greater part of his life in debauchery and crime. His mother, however, had provided that masses should be said for his salvation, and, being conveyed through the influence of these, he ended his days in a monastery, where he subjected himself to the severest penance.

As a dramatic type Don Juan is essentially the impersonation of the scepticism that results from sensuality, and is thus the complement of Faust, whose scepticism is the result of speculation. In its literary treatment it has received various degrees of intensity. In the hands of the earlier Spanish dramatists it becomes, without their intending it, a solemn and impressive moral beacon, while Byron's Don Juan is a gay adventurer, with nothing in common with the legendary personage except his name and his libertinism. The first introduction of the story into dramatic literature seems to have been in Lope de Vega's Money makes the Man, where the incident of a walking statue occurs; but the earliest occasion on which the story was dramatized as a whole was in the Burlador de Sevilla (The Deceiver of Seville) of Gabriel Telles, who published his secular works under the name Tiso de Molina. The Don Juan of this play is almost heroic in his fearlessness, indulging his cold grim humour without restraint even in the realized presence of the supernatural; but his unrestrained depravity revolts the moral sense. From Spain the drama was soon after 1620 transferred to Italy, where a translation of it was produced at Naples. A few years later it was transferred to Paris, where it was frequently acted, sometimes in the form of a translation of the work of Telles, and sometimes in more or less free imitations, of which several were produced. A new aspect was given to the character in Molière's Don Juan, ou le Faon de Pierre (1665), where the hero, though as heartily deprecating as in the Spanish original, loses some of the stern elements both of his wickedness and of his humour, and becomes more seductive and more amusing. Into English literature the story was first introduced by Shawell's Libertine (1676), a grossly indecent and, from a literary point of view, worthless play. The continued popularity of the legend in the country of its birth is attested by the fact that it has furnished the groundwork for many—Don Juan Tenorio (1844), and two poems—El Deyo del Diablo and Un Testo di Bronce (1845)—by the celebrated poet Zorrilla. During the present century it has been a favourite subject with French writers of the romantic school, having been dealt with by Dumas the elder, Musset, Levassor, Malville, and others. Its capacity for musical treatment has been tested by two composers of the first rank. Gluck made Don Juan the hero of a ballet, and Mozart's opera, Don Giovanni, the libretto of which was furnished by Da Ponte, has probably done more to popularize the story in the Molére as distinct from the severer early Spanish form than any other setting, literary or musical, it has ever received.

DONAGHADEE, a market town of Ireland, in county Down, situated near the mouth of Belfast Lough on the Irish channel, is the nearest port to Ireland to Great Britain, being 214 miles S.W. of Portpatrick in Wigtownshire. It consists of two principal streets, and possesses a harbour which admits vessels of 16 feet in draught. On the north-east side of the town there is a natural jetty, with a powder magazine left from the old military road. The town is frequented for sea-bathing in the summer months. Population (1871), 2236.

DONALDSON, John William, a philologist and biblical critic, born 1812, died February 10, 1861. He was educated at the London University and at Trinity College, Cambridge, of which college he was afterwards elected a fellow. He graduated in the year 1834, being placed in the second class of the mathematical tripos, and second in the classical tripos, when G. J. Kennedy was senior, and W. Forbush, the author of Hortensius, third class. After his degree he devoted himself with unremitting energy to classical philology, and the New Cratylus, which appeared five years later, is not only a work of wonderful erudition for so young a man, but forms a landmark in the history of philology in England. In 1841 he was elected to the head-mastership of King Edward's school at Bury St. Edmunds, a position which he held for over ten years. On resigning this post he returned to Cambridge, where his time was divided between literary work and private tuition. At the time of his death, which was accelerated by over-study, he was engaged in the preparation of a Greek lexicon.

The New Cratylus, the work on which Dr Donaldson's fame mainly rests, is an attempt to apply the general principles of comparative philology to the Greek language. The book consists of two parts—a general introduction, in which the philosophy of language and the ethnographic affinities of the ancient Greeks are discussed, and a treatise on the grammatical structure and etymology of Greek. It is mainly founded on the comparative grammar of Bopp, but a large part of it is original, and it is but just to the English philologist to observe that the great German's grammar was not completed till ten years after the first edition of the Cratylus. In the Varroanna, which followed in 1844, the same method is applied to the classification and analysis of Latin and the other Italian dialects. It includes a critical commentary on the remains of old Latin, Umbrian, and Oscan. If we consider the recent birth and rapid strides of philology it is not wonderful that these early essays should have been superseded by the riper labours of such men as Curtius, Schleicher, and Mommsen. Distinguished as Donaldson's works are by wide and varied learning, much ingenuity, and independence of thought, they are deficient in sobriety of judgment, and, most of all, in the ability to distinguish between certain inference and uncertain conjecture. More especially are these defects apparent in the ethnographical theories of the Varroanna. To take a single instance, the origin and affinities of the Etruscan language, problems which have yet to be solved are stated no less confidently than those of modern French.
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Before discussing his other works it is necessary to mention an unfortunate controversy which this book provoked. The charge of plagiarism was brought against the author by the late Professor Key, and a war of pamphlets followed as violent as those which were common in the days of Bentley and Porson. Without attempting to decide on the merits of this dispute, it is enough to state that though the obloquies of Donatello to Key ought in the first instance to have been more explicitly acknowledged, yet the structures of the latter were needlessly sweeping and aggressive.

We pass on to Donaldson's work as a biblical critic. In 1854 he published his Jashar, or Fragments of original Hebrew songs inserted in the Masoretic text of the Old Testament. The book was written in Latin, as an appeal ad aumen, to the learned world in general, and especially to German theologians. It is an attempt to reconstitute the lost book of Jashar from the remains of old songs and historical records, which, according to the author, are preserved in the existing text of the Old Testament. Here, too, we notice the same merits and defects as in the Cratylus, the same ingenuity and learning, the same rash and overconfident speculation. The bold views of the author on the nature of inspiration, and the free handling of the sacred text, provoked a storm of theological odium, but the only one of his numerous assailants who deserves mention is Dr Perowne. A full analysis of the book will be found in Smith's Biblical Dictionary, s. v "Jashar."

Of his numerous other works the most important are The Theatre of the Greeks, The History of the Literature of Ancient Greece (a completion of K. O. Muller's work), an edition of Tzerd, and a Hebrew, a Greek, and a Latin Grammar. Among his occasional writings the article "Philology" in the 8th edition of this Encyclopaedia is the most important. Though much of what he wrote has already become obsolete, Donaldson will long be remembered as one of the pioneers of philology in England.

DONATELLO (1386-1466), the diminutive of Donato, was the son of Niccolo Bardi, and was born in Florence in 1386. In the struggle between the rival parties of the Albizzi and the Medici, the father took part with the former, and was involved in their ruin. He must have been a man of considerable property, judging from the decree by which his houses are confiscated. His son Donatello found protection and shelter and the means of early training from the Martelli family, and to this connection must be ascribed Donatello's introduction to the great Cosmo de' Medici, pater patriae, who during the life-long relation between himself and the artist, did everything to ease, by kindness towards the son, the recollection of the sufferings which the house of Medici had inflicted on the father. He learned the goldsmith's trade under the father of the renowned Lorenzo Ghiberti, and the goldsmith's trade then included all kinds of bronze creations. At the age of seventeen he set out for Rome with his friend Brunellesco.

At Rome the two young men maintained themselves by working as goldsmiths during the first half of the week, devoting the second half to the study of the ancient monuments, and to making excavations in search of lost works of art. The Romans, we are told, believed them to be treasure-seekers. The Romans of Donatello's time still reflected the feelings with which their forefathers, nearly three centuries before, had wondered when the agents of Henry of Blois, bishop of Winchester, dug up and carried away from their city similar artistic treasures. On their return to Florence, rich in artistic knowledge and treasures, the careers commenced in which Brunellesco in which Brunellesco and Donatello destined to hang above the Florence cathedral the dome of the Pantheon, and Donatello impart to the multitudinous creations of his chisel, the truthfulness and grace and power for which he was so largely indebted to his ancient models. There exist 40 works of Donatello unquestioned authenticity, and 31 respecting which controversies have arisen; and 25, recorded by his contemporaries but no longer found, must be added to the number. When it is borne in mind that many of these works are life-size or colossal statues, or large bas-reliefs crowded with figures, an idea may be formed of the extent of his labours, prosecuted untringly during a life which extended to eighty years. He was fortunate in the precise period of his labours. During the whole of the previous century Florentine art had concentrated its efforts on the creation of its grand architectural monuments. In the second half of the 15th century sculpture was cultivated, but chiefly to adorn the palaces and gratify the vanity of the rich. Donatello, placed between the two periods, could devote his genius to the execution of the great plastic works required for the decoration and adornment of the state. Hence the statues of the church of St Michele, those on Giotto's belfry, the pulpit of St Lorenzo, those in the baptistery, as well as all the other works which still remain exactly where first placed—unhappily no longer the case with the St George—possess an exceptional beauty; for no sculptor ever studied more carefully than Donatello, the exact relation of a work to its local destination. The varied and characteristic elements of Donatello's art, what he borrowed from the antique, what peculiar tricks of drapery he took from his immediate predecessors, how, from his first habit of painting his figures he passed to the phase of purely sculptured effects, how he was influenced by his friend Brunellesco in his treatment of proportion and perspective, how he imparted a more pictorial character by the greater flatness of the figures to his bas-reliefs, all this forms one of the most interesting chapters in the history of Renaissance sculpture. Besides Florence he worked also at Rome, Padua, Venice, Siena, Modena, Mantua, and Ferrara; and he visited Rome a second time. In Padua he produced, in 1432, the equestrian statue of Gattamelata with some minor works, and as almost his latest work we may consider the statue of St Louis of France, executed for St Croce. To English students of art it may be satisfactory to learn that, in the opinion of Semper, the South Kensington museum possesses seven undoubted specimens of Donatello, besides one, the Magdalen seated on clouds, probably by a scholar, and a virgin and child of doubtful origin. Donatello, though best known as a sculptor, was likewise a painter,—at least was admitted as such into the academy of St Luca in 1412. We find him paid for architectural drawings and opinions respecting the dome of the Florence cathedral in 1420, and he was sent as military engineer to the siege of Lucca in 1430. His first trade of goldsmith was never abandoned. Thus varied and versatile, we cannot but form the highest opinion of one respecting whom Vasari has said that he threw the same love of art into every work great or small, and that he always of the more than laudable. His life-long attachment to his patron Cosmo was only equalled by his lavish kindness to his friends; for we read that the large sums received by him were kept in an open box in his workshop, and that his friends when wanting money were invited and expected to help themselves, no questions being asked or receipts given. In his last years he was provided for by Piero, the son of Cosmo. He died at Florence in 1466. Donatello's greatest works, his Baptists, David, Judith, St George, and Mark, are declared by some recent critics not to rise into the highest sphere of true Christian art. The sculptor, we are told, wasainted in a deep faith of Michelangelo himself, who, when gazing with generous admiration
on the St Mark, exclaimed, "So noble a figure could indeed write a gospel."

DONATI, GIOVANNI Battista, professor of astronomy at the Royal Institution of Florence, was born at Pisa, December 15, 1829, and died at Florence, September 20, 1873. In 1852 he became an assistant at the Florentine observatory, of which in 1864 he was appointed director. On June 2, 1855, he discovered the comet which bears his name (see vol. ii. p. 815). Other comets were discovered by him on June 5, 1855, November 10, 1857, and July 23 and September 9, 1861. He made numerous spectroscopic observations of comets and the solar disc, and in 1862 published diagrams of three or four lines in the spectra of fifteen stars. The new observatory on the hill of Arcetri, near Florence, was erected under his superintendence, and was directed by him. At the time of his death Donati had just returned from Vienna, where he was the representative of Italy in the international meteorological congress.

DONATISTS, a powerful sect which formed itself in the Christian church of northern Africa in the beginning of the 4th century. In its doctrine it sprang from the same roots, and in its history it had in many things the same character, as the earlier Novatians. The predisposing causes of the Donatist schism were the belief, early introduced into the African church, that the validity of all sacramental acts depended upon the personal character of the agent, and the question, arising out of that belief, as to the eligibility for sacramental office of the traditors, or those who had delivered up their copies of the Scriptures under the compulsion of the Diocletian persecution; the existing cause was the election of a successor to Menas, bishop of Carthage, who died in 311. Menas had held moderate views as to the question of the treatment of the traditors, and accordingly a strong factional party had formed itself in Carthage in opposition to him, headed by a wealthy and therefore influential widow, named Lucilla, and connived at by Secundus of TimgA, private of Numidia. There were thus two parties each anxious to secure the succession to the vacant seat. The friends of the late bishop fixed their choice on Cecilian, the archdeacon, and secured his election and his consecration by Felix, the bishop of Aptungs, before the other party were ready for action. It had been customary, though probably it was not essential, that the Numidian bishops should be present at the election and consecration of the bishop of Carthage; Cecilian's party had not waited for them, knowing them to be in sympathy with their opponents. Soon after Cecilian's consecration, however, Secundus and seniority of the Numidian bishops arrived at Carthage, and steps were at once taken to displace the new bishop. A synod was formed before which Cecilian was summoned, his consecration was declared invalid, on the ground that Felix had been a traditor; and finally, having refused to obey the summons to appear, he was excommunicated, and Mamas, a dependent of Lucilla's, consecrated in his stead. Thus the schism became overt, and in a very short time there were rival bishops and rival churches in most of the cities of North Africa, as well as in Carthage.

The inevitable appeal to the civil power to settle the dispute was first made by the Donatists, who were incited to do so by receiving proof, in their exclusion from certain privileges conferred on the African church, that the sympathies of Constantine were with the other party.

They accordingly petitioned the emperor to appoint a commission to try the case, indicating a preference for Gallic bishops, among whom there were no traditors, the Diocletian persecution not having extended to Gaul. The result was that a commission was issued to five Gallic bishops, under the presidency of Miltiades, bishop of Rome. The number of references was afterwards increased to twenty, and the case was tried at Rome in 313. Ten bishops appeared on each side, the leading representatives of the Donatists being Donatus of Carthage, and Donatus was found guilty of various ecclesiastical offences. An appeal was taken and allowed; but the decision of the synod of Arles (314) not only confirmed the position of Cecilian, but greatly strengthened it by passing a canon that ordination was not invalid because performed by a traditor, if otherwise regular. Felix had previously been declared innocent after an examination of records and witnesses at Carthage. Further appeal to the emperor in person was heard at Milan in 316; when all points were finally decided in favour of Cecilian. As a necessary consequence of this the power of the state was directed to the suppression of the dissident party. Persistent Donatists were no longer merely banished, they were rebels, and incurred the confiscation of their church property and the forfeiture of their civil rights.

The attempts to destroy by force a factional sect had its usual result in only increasing its fanaticalism and consolidating its sectarianism. Majorinus, the Donatist bishop of Carthage, dying in 315, was succeeded by Donatus, surnamed Magnus, a man of great force of character, under whose influence the schism gained fresh strength from the opposition it encountered. Force was met with force, and the Circumcellionists, bands of fugitive slaves and vagrant (rescellam celias) peasants, were enlisted as the champions of Donatism, and their violent reached such a height as to threaten civil war. In 321, Constantine, seeing probably that he had been wrong in abandoning his usual policy of tolerance in this case, sought to reverse his steps by granting the Donatists liberty to act according to their consciences, and declaring that the points in dispute between them and the orthodox should be left to the judgment of God. This wise policy, to which he consistently adhered to the close of his reign, was n.4 followed by his son and successor in the Western Empire, Constans, who, after repeated attempts to win over the sect by bribes, resorted to persecution. The renewed excesses of the Circumcellionists, among whom were ranged fugitive slaves, debtors, and political malcontents of all kinds, had given to the Donatist schism a socialistic aspect; and its suppression may therefore have seemed to Constans even more necessary for the preservation of the empire than for the vindication of orthodoxy. The power which they had been the first to invoke having thus declared so emphatically and persistently against them, the Donatists were led to adopt the theory known in more recent times as that of spiritual independence, which Donatus Magnus formulated in the question, "What has the emperor to do with the church?" (Quaest. imperatorum cum ecclesia.) Such a theory naturally accorded in the sect, and their outrage were in turn made the justification for the most rigorous measures against the whole Donatist party indiscriminately. Many of their bishops fell victims to the persecution, and Donatus and several others were banished from their sees.

With the accession of Julianus (361) an entire change took place in the treatment of the Donatists. Their churches were restored and their bishops reinstated, with the natural result of greatly increasing both the numbers and the fanaticism of the sect. A return to the earlier policy of repression was made under Valentinian I. and
Grotian, by whom the Donatist churches were again closed, and all assemblies of adherents of the sect forbidden. It was not, however, till the commencement of the 5th century that the sect began to decline, owing partly to the occurrence of a division within it, but still more to the arguments used against it by the greatest theologian of the early church. The division arose out of a quarrel between Maximian, a deacon in Carthage, and Primian, the successor of Parmenieus in the (Donatist) bishopric. Maximian, being excommunicated, formed a party which, as Neander puts it, "stood in precisely the same relation to the body of the Donatists as the Donatists themselves did to the Catholic church." The dispute was a source of weakness in itself, and still more by the unanswerable arguments it furnished to the Catholic party, who during the reign of the emperor Honorius made repeated and determined efforts to secure the extinction of the schism. In 405 an imperial edict was issued commanding the Donatists, under the severest penalties, to return to the Catholic church. Meanwhile the more appropriate weapon of argument was being effectively wielded by the Catholic party, under the leadership of one of the ablest controversialists the Christian church has ever known, Augustine, bishop of Hippo, after several years' negotiation, found it possible to arrange a great conference between the Donatists and the orthodox, which took place under the orders of the emperor at Carthage in 411. There were present two hundred and eighty-six Catholic and two hundred and seventy-nine Donatist bishops. Before entering on the proceedings the Catholics pledged themselves, if defeated, to give up their sees, while in the other event they promised to recognize the Donats as bishops on their simply declaring their adherence to the Catholic church. The latter proposal, though it was received with scorn at the time, had perhaps ultimately as much influence as the resistless logic of Augustine in breaking the strength of the schism. The discussion, which lasted for three days, Augustine and Aurelius being the chief speakers on the one side, and Primian and Petilian on the other, turned exclusively upon the two questions that had given rise to the schism,—first, the question of fact, whether Felix had been a traditor, and secondly, the question of doctrine, whether a church by tolerance of unworthy members within its pale lost the essential attributes of purity and catholicity. On the second point, to which alone absorbing interest attaches itself, the Catholic view was stated and defended by Augustine with a force of argument, an aptness of quotation from Scripture (often, however, founded on misinterpretation), and a beauty of language that all but compel assent. Nowhere else in polemical theology are there to be found more valuable statements as to the connection between the divine and the human elements in the communication of grace, and as to the relative importance of the two attributes of catholicity and purity respectively as tests of the true church. It is to be observed, however, that on the side of Augustine as well as on that of his opponents there is the inevitable confusion of thought that arises from failure to apprehend the distinction between the visible and the invisible church.

The decision of Marcellinus, the imperial commissioner, was in favour of the Catholic party on both questions, and it was at once confirmed on an appeal to the emperor. As in the case of the similar decision almost exactly a century earlier, there followed the severest penal measures against the schismatics, the clergy being banished and the laity subjected to heavy fines. The extinction of the schism, which all the arguments of Augustine had failed to effect, was at last to be brought about by persecution. The Donatists continued to maintain an independent existence until the 7th century, when they disappear from history, along with the whole Christian church of North Africa, before the invading Saracens.


DONATUS, Alciatus, a grammarian and rhetorician, who taught at Rome in the middle of the 4th century A.D., had the honour of numbering St Jerome among his pupils, and was the author of a number of professional works. We still possess his _Ars grammatica_, consisting of three parts, _De litteris, syllabalis, pedibus et tonis, De octo partibus orationis, _and De barbarismo, sobescismo, schematibus, et tropis_; the larger portion of his commentary on Terence, in a greatly interpolated condition; and a few fragments of his notes on Virgil preserved and severely criticised by Servius. The first of these works, and especially the section _De octo partibus_, though possessing little claim to originality, and in fact evidently based on the same authorities which were used by Charisius and Diomedes, attained such popularity as a school-book that in the Middle Ages the writer's name was at once confirmed on an appeal to the emperor. But it was not however without a quarrel between the emperor at Rome and the author at Naples in 1535, that the work was at once confirmed on an appeal to the emperor.

DONAUWOERTH, a town of Bavaria, in the circle of Swaba-Neuburg, 25 miles N. of Augsburg, on the left bank of the Danube, at the confluence of the Wornitz. It is of some importance as a river port, and the centre of a considerable agricultural trade; but its main interest is historical. Having grown up in the course of the 11th and 12th centuries under the protection of the castle of Mangoldstein, it became in the 13th the seat of the duke of Upper Bavaria, who, however, soon withdrew to Munich to escape if possible from the manes of his wife Maria of Brabant, whom he had there beheaded on an unfounded suspicion of infidelity. The town received the freedom of the emperors in 1308, and maintained its position in spite of the encroachments of Bavaria till 1607, when the interference of the Protestant inhabitants with the abbott of the Holy Cross called forth an imperial law authorizing the duke of Bavaria to inflict chastisement for the offence. In the Thirty Years' War which soon after broke out, it was stormed by Gustavus Adolphus in 1632, and captured by King Ferdinand in 1634. In the vicinity the Bavarians and French were defeated by Marlborough and France
Louis of Baden in 1704. The imperial freedom restored to the town by Joseph I. in 1705 was again lost by re

Doncaster, the Donnus Antoninus and Dona

Ceaster of the Saxons, a

county borough and market-town of

England, in the west rind

of Yorkshire, 32 miles S. of York and 156 miles N. of London by railway, in the line of the ancient Roman road of Ermine street or, as some write, Watling street, is situated on the right bank of the Don, over which and an arm of it called the Cheesewold it has two bridges. The parish church of St George, occupying the site of an older structure of the same name destroyed by fire in 1553, was finished in 1588 at a cost of £15,123; its tower is 172 feet high. Among the other public buildings are Christ Church and St James's, the mansehouse, market-hall, guildhall, theatre, grammar school, infirmary, and jail. The commerce of Doncaster is mainly agricultural, and the corn market is of considerable importance. The manufactures are iron and brass ware, sacks and jute, spun flax, ropes, and agricultural machines. About a mile to the southeast of the town is the race course, which is nearly circular, and has a circumference of 1 mile 7 furhongs and 70 yards; the principal races held annually commence on the Tuesday after the 10th of September. The grand stand, erected in 1777, has been frequently altered and improved, but has lost much of its importance by the erection of minor stands. Races have long been held at Doncaster, and there was a stand on the course before the year 1615. The St Leger race takes its name from Lieut.-Gen. St Leger, who originated it in 1776; but it was not so named till 1778. Doncaster received its first charter from Richard I. in 1399, after landing at Ravenpur, Bolingbroke, subsequently Henry IV., lodged for a time in the town. In 1671 the population of the municipal borough was 18,763.

The area is 1691 acres.

Doncaster, a maritime county in the extreme northeast of Ireland, in the province of Ulster, bounded on the N. and W. by the Atlantic Ocean, on the E. by Lough Foyle, and the counties of Londonderry and Tyrone, and on the S. by Donegal Bay and the counties of Fermanagh and Leitrim. It covers an area of 18704 square miles, or 1,197,134 acres, of which 22,880 are under water.

Coast.—The county possesses a large extent of sea-coast indented by numerous inlets. Ballyshannon harbour, the most southern of them, is small, and has a bar at its mouth, as have Donegal and Inver harbours farther west. Kilbegs has been well sheltered, and capable of receiving large vessels. On the western coast are Bruckles or M'lSney's Bay, and Teelin harbour, suitable for small vessels; and on the north is Sheephaven, within which is Dunfanaghy Bay, where the largest ships may lie in safety, as they may also in Malvoy Bay and Lough Swilly farther east. Lough Foyle, which divides Donegal from Londonderry, is a noble sheet of water, but is shallow and dry at ebb tide, contracted at its entrance, and encumbered with shoals. A few miles from Malin Head, the most northerly portion of the mainland of Ireland, the varied and extensive Lough Swilly runs far into the interior. From these two longs much land has been reclaimed. Numerous islands and rocks stud the coast. The largest island is North Aran, about fifteen miles in circumference, with a lofty hill in its centre, and a gradual declivity down to the sea. On the northern coast are Tory Island, on which is one of those angular round towers marking the holy places of ancient times, and, farther east, Innishblad the ultima Thule of Ireland. The inhabitants of the islands obtain a precarious livelihood by fishing, kelp-burning, and rude husbandry, but are often reduced to extreme destitution.

Mountains.—Mountains and irregular groups of highlands occupy the whole interior of the county, and a considerable portion is bog and moor land. Arrigal mountain attains an elevation of 2462 feet above the level of the sea, and commands from its summit a fine view over a considerable portion of the country. Bluestack (2313 feet), Muckish mountain (2190 feet) in Kilmacrenan barony, and Sleeve Snaght (2019) in Inishowen are, next to Arrigal, the highest mountains. The eastern and southern portions of the county are comparatively level, and contain the most fertile land. Occasionally the mountain land is cut by the streams, which form the eastern districts and most of the barony of Bannagh. From Sheephaven to Lochmores and the north-western coast, granite forms the surface rock, and quartz is very abundant, often forming mountains of considerable elevation. Carboniferous or mountain hiras

stones occurs round Donegal Bay. The geological aspect of the county affords many indications of internal wealth, but very few attempts have been made to ascertain the mineral resources of the district. The minerals hitherto discovered are lead and iron. Steatite is worked to some extent at Garvan. Manganes, copper pyrites, and clay for potteries and brick-making are also found. Silicious sand, raised in Muckish Mountain, was formerly conveyed in large quantities to Belfast and Scotland for the manufacture of glass. Indications of coal have been observed near Lough Swilly, and at Inver on the southern coast; and marble of fine quality exists in many places. Among the mountain streams the pearl mussel (Unio margaritifera) is sometimes found. There are several mineral springs, the chief of which is the sulphureo-chalybeate water at Ballymard near the town of Donegal.

Rivers.—With the exception of the tidal river Foyle, which forms the boundary between this county and Tyrone and Londonderry, the rivers, though numerous, are of inferior size. The branches of the Foyle which rise in Donegal are the Derg, issuing from Lough Derg, and the Finn, rising in the beautiful little lake of the same name in the highlands, and passing through some of the best cultivated land in the county. The Foyle, augmented by their contributions, and by those of several other branches from Tyrone and Londonderry, proceeds northwards, discharging its waters into the southern extremity of Lough Foyle, at the city of Londonderry. It is navigable for vessels of large burden to this place, and thence by lighters of fifty tons as far as Lifford. Boats of fourteen tons can proceed up the Finn river as far as Castletown. The fine river Erne flows from Lough Erne through the southern extremity of the county into the southern extremity of Donegal Bay. Its navigation is prevented by a fall of 12 feet, generally called the Salmon Leap, in the neighbourhood of Ballyshannon, and by rapids between Ballyshannon and Belleek, on the confines of Fermanagh. The Gaugh, the Awn Es, and the Eak are the only other streams of any note.

Lakes, or rather tarns, are very numerous in Donegal.

Arms of Doncaster

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The most remarkable, and also the largest, is Lough Derg, comprising within its waters several small islets, on one of which, Station Island, is the cave named Saint Patrick’s Purgatory, a celebrated place of resort for pilgrims and devotees. The circumference of the lake is about nine miles, and the extent of the island to which the pilgrims are ferried over is less than one acre. The landscape around Lough Derg is desolate and sombre in the extreme, barren moors and heathy hills surrounding it on all sides.

Agriculture.—The modes of agriculture present little that is peculiar to the country, and the spade still supplies the place of the plough where the rocky nature of the surface prevents the application of the latter implement. The soil of the greater portion of the county, i.e., the granite, quartz, and mica slate districts, is thin and cold, while that on the Carboniferous limestones is warm and fertile. Owing to the hilly nature of the soil, agriculture has not made much progress, although in certain districts (Gweedore, for instance) much land has been brought under cultivation, through the enterprise of the proprietors. In 1871 about 43½ per cent. of the land was return as bog and waste, about 35 per cent. under pasture, and 21 per cent. under tillage. As an indication of the stationary condition of the husbandry of Donegal, it may be stated that the number of acres returned as under crops in 1853 was 236,097, while in 1876 it was 236,015.

The following statistics will show the details of the agricultural acreage and the numbers of the inhabitants, especially as regards the imperial returns of 1876. In 1876 the county contained 255,158 persons, in 1861, 237,390, and in 1871, 218,334, of whom 106,089 were males and 112,254 females—thus showing a decrease within these 20 years of 14½ per cent. In 1875 the population was estimated at 305,657. After Cavan, Donegal is the most Catholic county in Ulster. In 1871, 75 per cent. of the inhabitants belonged to that persuasion, while 12½ per cent. were Episcopalians and 10½ per cent. Presbyterians. Education in the same year was conducted in 7 superior and 407 primary schools. There were, however, 95,280 persons above five years of age who were returned as illiterate, and 18,629 who could speak Erse only. The Donegal dialect is said to be the purest of the Irish language.

The county returned no fewer than twelve members to the Irish parliament,—two for the county at large, and two for each of the insignificant boroughs of Ballyshannon, Donegal, Killybegs, Lifford, and Johnstown. Since the union with Great Britain, it has been represented in the imperial parliament by two county members only.

Wheat and barley are quite an inconsiderable crop, and in this as well as in other respects Donegal is much behind the rest of Ulster in the extent of its crops. It bears, however, a more favourable comparison as regards its live stock, possessing, as it does, the largest number of cattle and sheep of any county in the province, and after Cavan the largest number of poultry.

As regards the division of the land, according to the Return of 1876, the county was held, in 1874, by 2174 separate owners, whose estates amounted in the aggregate to 1,723,536 acres, valued at £340,632. These were 1171 proprietors of less than 1 acre of ground, forming a proportion of 54 per cent. of the total proprietors,—that of all Ulster being 45 per cent. The average size of the properties was 539 acres, and the value per acre, £1. 9s. 9d., while the averages for Ulster were respectively 399½ acres and 15s. 8½d. Sixteen proprietors owned more than 15,000 acres each, and together an aggregate equal to about 45 per cent. of the whole. They were the following:—Marquis of Conyngham, 123,960 acres; Earl of Lorn, 54,553; H. G. Murray Stewart, 30,916; W. H. M. Shawt (Glenmore), 39,564; A. J. R. Stewart (Castlemore), 39,360; John Leslie, 28,827; George Harvey, 25,593; Lord G. A. Hull, 24,189, Messrs Musgrave, 23,673; Sir Samuel H. Hayes, Bart., 22,825; Thomas Connolly, 22,736; Church Temporalities Commission, 21,498; Wybrenah Oliphant (Bally 

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<th>Year</th>
<th>Total</th>
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Lifford, the county town (population 660), and formerly a parliamentary borough, is practically a suburb of Strabane, in the neighbouring county of Tyrone. But Lifford (population 2958) is the most populous and important town in the county. It stands on both sides of the river Erne, but does not derive much advantage from its favourable situation in consequence of the fall of the river, usually called the Salmon Leap, above the town, and the bar at the mouth of the harbour. Lettekeny at the head of Lough Swilly, with 2116 inhabitants, is, next to Ballyshannon, the largest town in the county. Donegal (population 1422), is situated at the foot of a range of hills in the midst of scenery of great natural beauty, with a mineral spa in the neighbourhood, and sea-bathing close to the town.

History.—The greater part of Donegal was once called Tyrconnell, or the country of Conal; and it was sometimes called O’Donnell’s country, after the head chieftains of the district. The chieftains of note were O’Donnell, O’Boyle, O’Gallagher, O’Gormley, O’Breslin, &c. Tyrconnell is connected with some of the earliest events recorded in Irish history or tradition. The celebrated O’S dull, who was crowned king of Donegal, and thepee of their inauguration the rock of Dun in Kilmaurs. The celebrated Lied John O’Donnell, one of the most distinguished chieftains of the race, in conjunction with the Earl of Tyrone, became a formidable opponent to the Government of Elizabeth; but being ultimately defeated, he sailed to Spain to solicit fresh succours, was there seized with the English, and was hanged at Valinold. Rory O’Donnell, who was promoted to the chieftainship by the English Government, and created Earl of Tyrconnell, a title
now extinct, became afterwards disaffected to the Government and fled to Rome, where he died in exile, his estates having been previously confiscated by James I. In 1648, Sir Cahir O'Caholy, Lord of Innishannon, deposed by hopes of aid from Spain, raised an insurrection against the English Government in Ulster. He burnt Londonderry and purchased a good-sized fort there, and when the Lord Deputy Chichester having offered a reward for his head, he retired to the wilds of Kilmeangan, and was shot by a Scotch dragoon on his escape from the risk of Donoughmore's estates being confiscated and transferred to Chichester, the ancestor of the earls and marquesses of Donegall. Shortly afterwards, the confiscation of Ulster with English and Scotch undertakers and the proceeds, in pursuance of the scheme of James I, was partially carried out, and the baronies of Loughjeg and Banough were allotted to John Murray, Sir James Cunningham, Sir John Stewart, and others, the district of Portglenone, the London Greasers' Company obtaining Muff in Innishannon, Sir Roger Bloyley, Sir John Kingsmill, and other English settlers in the plantation districts of Lisfar, Sir William Stewart, Sir John Kingsmill, Sir George Macarne, Captain Hart, Sir M. McKowne, Turibgh Roe O'Boyle, MacSwine Bunagh, MacSwine Fannet, and other settlers and natives the district of Kilmeangan. Since the period of the settlement of Ulster, no forgeries have taken place in this country. The landlords remained loyal in the rebellion of 1641, and also during the war of the Revolution.

This district was formed into the county of Donegal in the reign of Queen Elizabeth, in 1555, by the Lord Deputy Sir John Perynt. Antiquities--The most noticeable architectural remains of ancient times in the county are to be found at the head of Lough Swilly, where, situated on the summit of a hill 502 feet high, some remarkable remains exist of a fortress or palace of the Northern Irish kings. These ruins are known as the Grannagh Castle, and evidently date from a period prior to the 12th century. On Tory island there is one of the best specimens of a round tower and some other interesting remains.

Numerous ruins of ancient castles along the coast prove that much attention was formerly paid to the defence of the country from foreign invasion. The principal among these is the ancient stronghold of the O'Clery, near Ballyshannon, Donegal Castle, built by the O'Donnells, formerly the chief residence and seat of the head of the clan. It was destroyed, however, by the Earl of Tyrone, and seen to advantage from the summit of the hill. The castle is situated on a steep hill above the river, and the remains consist of a strong tower and walls.

Near the Castle of Doe, or McSwiney's Castle, at Horn Head, is a natural portion in the roof of a cave, called McSwiney's Gun, formed by the workings of the ocean into the overhanging cliff. When the wind blows from the north, and the tide is at half flood, the gun is seen to spout jets of water to a height of 100 feet, attended with explosions heard occasionally in favourable weather at an immense distance.

The castle of Dunlewey, on the coast of Lough Swilly, is supposed to have been erected by the O'Donnells, and is said to have been taken by Sir Robert Ker, the 12th Earl of Mar, on the 22nd of July, 1609. The castle was afterwards burned.

Traces of religious houses, some existing only in tradition or documentary records, are also numerous. Ashle Aberry, on a small island near Ballyshannon, was a place of great extent. The ruins of Donegal, founded in 1747, are also said to be of its ancient grandeur. It is a place where the celebrated collection of ancient Irish plays was written, known by the name of the Annals of the Four Masters, and sometimes called the Annals of Donegal, compiled in the year 1642, by Michael O'Clery and his coadjutors.

Dongola, or Donkoli, a town of Egypt, in the district of the same name in the province of Nubia, situated on the left bank of the river Nile, about 15 miles above the Third Cataract. It is frequently styled Dongola Mokarak, or New Dongola, to distinguish it from Dongola Agua, or Old Dongola, a now deserted village 75 miles further up the river, which was formerly a flourishing fortified town, but fell into ruins after the devastation of the Mamelukes. Ksar Dongula, or Castle Dongula, and El Ordeh, or The Barracks, are also names in use. The town grew up round the military and administrative buildings established about 1520 by the Egyptian Government, and it is now a thriving commercial centre, with well-formed bazaars, an indigenous factory, and a large trade with the European and Indian nations. The town has lately been much frequented by the celebrated German naturalist Ehrenberg Population about 6000.

Donizetti, Gaetano (1797-1848). There is a strange parallelism observable in the lives of the three most celebrated Italian composers of the present century. Rossini, Bellini, and Donizetti had no sooner established their reputations on the Italian stage than they left their own country for Paris, at that time the centre of the musical world. All three settled in France, and all three were anxious to adapt the music of their particular times and artistic traditions of their adopted country. The difference which exists between Rossini's Tell and his Semiramide may, although in a less striking degree, be noticed between Donizetti's Fille du Régiment and one of his earlier Italian operas. But here the parallel ends. As regards artistic genius Donizetti can by no means be compared with his illustrious countrymen. He has little of Bellini's melancholy sweetness, less of Rossini's sparkle, and is all but devoid of spontaneous dramatic impulse. For these shortcomings he atones by a considerable though by no means extraordinary store of fluent melody, and by his rare skill in writing for the voice. The duet in the last act of the Fille du Régiment and the celebrated envoi of L'Elisir d'Amore, must account for the unpainted vitality of many of his works on the stage.

The life of Donizetti may be told in few words. He was born at Bergamo in 1797, the son of a military officer of limited means. Originally destined for the bar, he showed at an early age a strong taste for art. At first, strangely enough, he mustook architecture for his vocation, and only after an unsuccessful trial in that direction did he discover his real talent. He entered the conservatoire of his native city, where he studied under Simon Mayr, the fertile operatic composer. His second master was Mattei, the headmaster of the celebrated music school of Bologna, where Donizetti resided for three years. After his return to Bergamo the young composer determined to devote himself to dramatic music, but his father insisted upon his giving lessons with a view to immediate gain.

The disputes arising from this cause ultimately led to Donizetti's enlisting in the army. But this desperate step proved beneficial against all expectation. The regiment was quartered at Venice, and here the young composer's first dramatic attempt, an opera called Enrico Conte di Borgogna, saw the light in 1818. The success of this work, and of a second opera brought out in the following year, established Donizetti's reputation. He obtained his discharge from the army, and henceforth his operas followed each other in rapid and uninterrupted succession at the rate of three or four a year. Although he had to contend successively with two such dangerous rivals as Rossini and Bellini, he succeeded in taking firm hold of the public, and the brilliant reception accorded to his Anna Bolena at Milan earned him his name beyond the limits of his own country. In 1833 Donizetti went for the first time to Paris, where, however, his Maria Furtiari failed to hold its own against Bellini's Farnanym, then recently produced at the Théatre Italien. The disappointed composer went to Naples, where the enormous success of his Lucia di Lammermoor compelled him for his failure in Paris. For Naples he wrote a number of works, none of which is worth notice. In 1810 the censorship refused to pass his Poliuto, an Italian version of Corneille's Polyxena, in consequence of which the disgusted composer once more left his country for Paris. Here he produced at the Opéra Comique his most popular opera, La Fille du Régiment, but again with little success. It was not till after the work had made the round of the theatres of Germany and Italy that the Parisians reconsidered their unfavourable verdict. A serious opera, Les Matyrs, produced about the same time with the Daughter of the Regiment, was equally unsuccessful.
ful, and it was reserved to La Favorita, generally considered as Donzetti's masterpiece, to break the evil spell. His next important work, Linda di Chamounix, was written for Vienna, where it was received most favourably in 1842, and the same success accompanied the production of Don Pasquale after Donzetti's return to Paris in 1843. Soon after this event the first signs of a fatal disease, caused to a great extent by overwork, began to show themselves. The utter failure of Don Sebastiano, a large opera produced soon after Don Pasquale, is said to have hastened the catastrophe. A paralytic stroke in 1844 deprived Donzetti of his reason; for four years he lingered on in a state of mental and physical prostration. A visit to his country was proposed as a last resource, but he reached his native place only to die there on April 1st, 1846. The sum total of his operas amounts to 64, the more important of which have been mentioned in the course of this notice. The large number of Donizetti's works at the same time accounts for many of their chief defects. His rapidity of working made all revision impossible. It is said that he once wrote the instrumentation of a whole opera within thirty hours, a time hardly sufficient, one would think, to put the notes on paper. And yet it may be doubted whether more elaboration would have essentially improved his work; for the last act of the Favorita, infinitely superior to the preceding ones, is also said to have been the product of a single night.

DONNE, John (1573-1631), poet and divine of the reign of James I, was born in London in 1573 of Catholic parents. His father was a wealthy and influential merchant, a Welshman by descent; his mother claimed relationship with Sir Thomas More and Heywood the epigrammatist. Brought up under tutorage at home until his tenth year, he proceeded to Oxford, and was entered at Hart Hall about 1588. At the university his learning was extraordinary, and he was compared for juvenilia erudition, with Pico della Mirandola. In 1588 he was removed to Trinity College, Cambridge, but he took no degree there or at Oxford, his scruples as a Catholic standing in the way. In 1590 he went up to London and was admitted into Lincoln's Inn. His father presently died, and left his son £5000. Until he came of age, he was under his mother's care. It is supposed that this was the period to which he refers in Pseudo-Martyr, in which an increasing conviction of the truth of Protestantism struggled with the old faith and familiar surroundings. Walton has given an interesting account of Donne's change of faith, which probably took place about 1592. Before this he must have been writing some of the sonnets of the Divine Poems, and of these not the worst, are obviously written by a sincere Catholic. The rebound from Catholic asceticism was a severe trial to an ardent nature; it seems that he plunged into various excesses, and that his father's legacy was rapidly squandered. In 1593, however, he had already laid the foundation of his poetical reputation. The first three of his famous Satires exist in a MS. dated 1593, and the rest appear to have been composed at various times before 1601. In 1594 he commenced his travels, wandering over Europe, and accompanying the earl of Essex at the taking of Cadiz in 1596, and again in the expedition of 1597. It has been thought that he was engaged in military service in Holland in 1596. He did not return to England until he had seen Italy, and was planning an excursion into Palestine, when the difficulty of travelling in the East diverted his thoughts to Spain. In both Italy and Spain he took considerable pains to master the language and existing literature of his country; the notes to his works testify. It is possible that the fantastic Spanish school of conceits, which takes its name from Gongora, may have affected the style of Donne. Returning to
so far suffered that he was persuaded by his friends to go abroad, and to spend more than a year in Germany. In 1619 he returned, with the expectation of the deanery of Canterbury. This he did not gain, but in 1620 he was appointed dean of St Paul's. To the kindness of the Earl of Dorset he owed the vicarage of St Dunstan in the West. In 1624 he was elected procurator to Convocation, and the same year was attacked by an illness that threatened to prove immediately fatal, but from which he rallied. He continued in health for some years, and for the last time before Lent 1630, an oration which the king called "the Dean's own funeral sermon," and which was printed, under the title of Death's Duet, in 1632. On the 31st of March 1631, he died, having previously prepared himself in his winding sheet to have his portrait taken. He was buried in St Paul's cathedral. Very few of Dr Donne's writings were published during his lifetime. It is supposed that an edition of the Satires may have been printed before the close of the 16th century, but if so, it has entirely disappeared. His poems were first collected in 1633, and afterwards in 1635, 1639, 1649, 1650, 1651, and 1659, of which editions the second and last appear to be tolerably trustworthy. Of his prose works the Joviusella appeared in 1633; the L.L.L. Sermons, with an admirable life of the author by Izaak Walton, in 1640, the Essays in Divinity in 1650, and the Letters to Several Persons of Honour in 1651. No very excellent modern biography of the poet or edition of his works has been issued. Dr A. B. Grosart's privately printed edition of the poetical works is very complete.

It is singularly difficult to pronounce a judicious opinion on the writings of Donne. They were excessively admired by his own and the next generation, praised by Dryden, paraphrased by Pope, and then entirely neglected for a whole century. The first impression of an unbiassed reader who dips into the poems of Donne is unsatisfactory. He is repulsed by the intolerably harsh and crabbed versification, by the recitative choice of theme and expression, and by the oddity of the thought. In time, however, he perceives that behind the fantastic garb of language there is an earnest and vigorous mind, an imagination that harbours fire within its cloudy folds, and an insight into the mysteries of spiritual life which is often startling. Donne excels in broad flashes of wit and beauty, and in sudden daring phrases that have the full perfume of poetry in them. Some of his lyrics and one or two of his elegies excepted, the Satires are his most important contribution to literature. They are probably the first poems of their kind in the language, and they are full of force and picturesqueness, and obscure and knotty language only serves to give peculiar brilliancy to the not uncommon passages of noble perspicacity. To the odd terminology of Donne's poetic philosophy Dryden gave the name of metaphysics, and Johnson, borrowing the suggestion, invented the title of the metaphysical school to describe, not Donne only, but all the amorous and philosophical poets who succeeded him, and who employed a similarly fantastic language, and who affected odd figurative inversions.

(E. W. G.)

DONOVAN, EDWARD, naturalist, was author of many popular works on natural history and botany. In 1792 appeared the first volume of his Natural History of British Insects, which extended to sixteen volumes, and was completed in 1816. Although now superseded, this compilation did good service in its time. During the same period Donovan published Natural Histories of British Birds, in 3 vol. (1799-1819), and British Fishes, in 5 vol. (1802-1808), of British Shells, in 5 vol. (1800-1804), a series of illustrated works on The Insects of India, China, New Holland, &c., in 3 vol. (1798-1805), and Excursions in South Wales and Monmouthshire (1809).

To these works must be added his periodical entitled The Naturalist's Repository, a monthly publication, of which three volumes were completed (1823-1825), and an Essay on the Minute Parts of Plants in general. Donovan was author of the articles on natural history in Ree's Cyclopaedia. In his old age this hard-working student and writer published a Memoir respecting my Publications in Natural History, in which he complains of the small profits accruing to him from the sale of his books. We have searched in vain for any biographical particulars of Donovan,—the only facts apparently recorded being that he was a fellow of the Linnean Society, and that he died in London, February 1, 1837.

DORAT, JEAN. See DAURAT.

DORCHESTER (the Dorum, the Doroom of the Romans), a parliamentary and municipal borough and market town of England, capital of the county of Dorset, situated on an eminence on the right bank of the Frome, 8 miles N. of Weymouth, and 129 miles from London by the old coach road, but some 20 miles farther by railway. It stands within a wide open tract of land, containing 3,400 acres, held under the duchy of Cornwall, called Fordington Field. It is governed by a mayor, four aldermen, and twelve councillors, and returns one member to parliament. The population of the borough in 1871 was 6915, the area 635 acres. The town, consisting chiefly of three spacious streets, is neat and pleasantly situated, and is nearly surrounded by fine avenues. St Peter's church is an ancient edifice in the Perpendicular style, containing some curious monuments. The grammar school has two exhibitions to St John's College, Cambridge, and one to each university. Of the other public buildings the principal are the town-hall, with market-house, shire-hall, county prison, and county hospital; there is also a small county museum, containing many local objects of much interest. The cavalry barracks in the vicinity may also be noticed. There are also several almshouses and other charities, and a savings-bank. Market days, Wednesday and Saturday. The woollen manufacture of Dorchester was once considerable, and it was noted also for its ale, of which there are still some popular breweries. It is a place of considerable trade, and large sheep and lamb fairs are held there annually. The borough includes four parishes—All Saints, St Peter's, Holy Trinity, and Fordington. In the vicinity there are some interesting remains, including an amphitheatre, the most perfect of its kind in England. The seats for the spectators are formed of masses of chalk, rising 30 feet above the arena. This amphitheatre when perfect is supposed to have been capable of accommodating 13,000 spectators. The camp called Poundbury, to the N.W. of the town, is probably Roman, and well worthy of examination. Durnovaria was one of the principal stations in England of the Romans, by whom it was surrounded with a wall and fosse, part of the former being still standing. Here Judge Jeffreys's "bloody assize" was held in September 1685, when 292 prisoners were sentenced to death.

DORDOGNE, an inland department in the S.E. of France, taking its name from the river which traverses its centre from east to west, and formed from nearly the whole of Périgord, a part of Agénais, and small portions of Limousin and of Angoumois. It is bounded on the N. by the Haute Vienne, W. by Charante and Charente Inferieure, S.W. by Gironde, S. by Lot-et-Garonne, and E. by Lot and Corrèze, and lies between 44° 45' and 45° 42' N. lat., and from 0° 1' 51" to 1° 26' 49" W. long. Its surface is beautifully variegated, comprising small mountains,—some
of which are covered with vines and crowned with wood, and others rocky and barren. — Large plateaux, and a few pleasant valleys. In the north is wild and sterile, and in the west is covered with forests of pine, but the splendid valley watered by the Dordogne is rich in vines, fruit trees, and cereals. The climate is generally agreeable and healthy, but rather humid, especially in the south. Dordogne as watered by 11 rivers, and more than 600 streams, all tributaries of the Dordogne except the Bandiat and the Dropt. The Dordogne itself is formed by the union of two mountain streams, the Dor and the Dogne, which rise in Mont d'Or, Pay-de-Dôme, and unite after a short course. Sufficient corn is grown in the department for home consumption. The cultivation of the vine occupies about a tenth of its surface, and its red and white wines are in high repute. Its truffles are considered the best in France. In the forests the prevailing trees are the oak and chestnut. The fruit of the latter is much used both as food by the people and for fattening hogs. The walnut is extensively cultivated for making oil. Dordogne is rich in various kinds of minerals; iron is very abundant, and there are found also copper, lead, manganese, coal, marble, alabaster, lithographic stones, lime of gypseum, &c. The chief branches of industry are the working in metals, particularly iron and steel, the manufacture of paper, and boat-building; but there are also produced coarse woollens, sergees, leather, earthenware, hosiery, vinegar, brandy, and liqueurs.

Dordogne is divided into the arrondissements Périgueux, Bergerse, Nontron, Ribéac, and Sarlat, with 47 cantons and 532 communes. The chief town is Périgueux. The total area is 3545 square miles, and the population in 1872 numbered 460,142.

Doria, Andrea (1466–1560), the famous Genoese admiral, was born at Oneglia in 1466. He belonged to a noble family, several of whose members, both before and after his time, distinguished themselves in the history of Genoa. Having lost both his parents in his youth, he embraced the military profession, and served in the papal guards and under various princes of Italy. It was not until he was fifty years of age that he entered into the service of Francis I. of France, who gave him the command of his fleet in the Mediterranean. In this position he preserved that spirit of independence which is so natural to a sailor and a republican. When the French attempted to render Savoia, long the object of jealousy of Genoa, its rival in trade, Doria monstredly against the measure; this irritated Francis to such a degree that in 1558 he ordered his admirar Barbéins to sail for Genoa, then in the hands of the French troops, to arrest Doria, and to seize his galleys. Doria, however, retreated with all his galleys to a place of safety, and closing with the offers of the emperor Charles V., returned his commission to Francis, and husted the imperial colours. To deliver his country, now weary of the French and the imperial yoke, from the dominion of foreigners, was Doria's highest ambition; and the favourable moment had presented itself. Genoa was afflicted with the pestilence, the French garrison was ill paid and greatly reduced, and the inhabitants were sufficiently disposed to second his views. Before the close of the same year (1558) he sailed to the harbour with thirteen galleys, landed five hundred men, and made himself master of the gates and the palace with very little resistance. The French governor with his feeble garrison retired to the citadel, but was soon forced to capitulate; upon which the people speedily levelled the citadel with the ground. It was now in Doria's power to have declared himself the sovereign of his country; but, with a magnanimity of which there are few examples, he assembled the people in the court before the palace, disclaimed all pre-eminence, and recommended to them to settle what form of government they chose to establish. The people, animated by his spirit, forgot their factions, and fixed, with his approval, that republican form of government which, with little variation, subsisted until 1815. His disinterested patriotism won for him the appointment of censor for life and the title of "Father and Liberator of his Country." Doria afterwards engaged in an expedition against the Turks, from whom he took Coroa and Patras. He also co-operated with Charles V., in the reduction of Tunis and Goullete. In 1547 two successive attempts were made against his life by Fieschi and a Genoese emigrant of the name of Giulio Cibo. He resigned his command in 1556, and died at Genoa in November 1560, being then ninety-four years of age.

DORIANS, the name by which one of the two foremost races of the Hellenic or Greek people was commonly known, the other being the Ionics. These two races, if the term may here be rightly used, stand out in marked contrast, as exhibiting different types of character, which have their issue in different modes of thought and forms of government. But when from a consideration of their political and intellectual development we endeavour to work our way backward to the origin and early history of these races, we find ourselves confronted by traditions which show little consistency, or which even exclude each other. The writer who speaks with the greatest confidence on this subject is the perfectly truthful man who well earned his title to be known as the father of history; but Herodotus, although thoroughly to be trusted as to all that he relates from his own experience, could not rise much above the standard of his age in dealing with alleged matters of fact, nor could he see that the eking out of theory by conjecture is an illegitimate process. Herodotus then, in speaking of the Athenians and Spartans as standing at the head severally of the Dorian and Ionian races, states positively that the Ionian was a Pelasgic, the Doran a Hellenic people; that the former had always been stationary, while the latter had many times changed its abode. In the time of Deucalion, he asserts, the Dorians, or rather the tribe or tribes which were afterwards to be called Doriens, inhabited Phthiotis, by which he probably understands the southern portion of the great Thessalian plain. Afterwards, under their eponymous Dorus, they occupied their Hues, which he describes as the region under Ósas and Olympia. They had thus migrated from the most southerly to the most northerly parts of the great plain which is drained by the Peneius. The next migration was to the highlands of Pindus, the chain which runs down at right angles from the Cambunian range, or the westward extension of Olympus. Here, he says, they were known not as Doriens, but as Macedonians. A later southward migration brought them into Dryopis, whence they made their way into the Peloponnese, and it would seem were then only first known as Dorans (Herod. i. 56).

If we examine the statement thus boldly advanced, we shall find at each step that the ground becomes more uncertain. We may indeed, in order to establish that the Pelasgic race was closely akin to the Greek, and that their language stood Hellenic before Hellenic, we may judge from the Pelasgan populations which he found at Placa, Scylace, and Creston, the Pelagians generally must have spoken a barbarous dialect, i.e., a dialect unintelligible to a Greek. He is thus driven to assume, first, that the Attic tribes had been Pelasgic before they became Hellenic, and that the change was accompanied by a change of language (Herod. i. 57). Elsewhere (ii. 51) he speaks of the Athenians as being already Greek or Hellenic before
the Pelasgians became their neighbours, and adds that the latter came in time to be reckoned Hellenic also. We thus see, without going further, how vague and uneasy were the notions of Herodotus; but we have to note further that the account here given of the Dorians and Ionians is said to apply to the time of Croesus, and thus, down to his age, the Ionians had been stationary in their original abodes, these abodes in his day being assuredly not in the Peloponnesus. Yet he can assert elsewhere that the Peloponnesians had been their original home, and that they had been expelled from it by the Achaeans (i. 115). But, apart from the fact that the poets of the Iliad and the Odyssey know nothing of any expulsion of Ionians from Peloponnesus, the difficulties are increased if we betake ourselves to the tribal genealogies which the Greeks regarded as undoubtedly historical documents. We have then, on the one side, the assertion that the Ionians were originally non-Hellenic and Pelasgians; on the other, the Taphian genealogy speaks of Dorians, Achaeans, Ionians, and Eolians, as being all sprung from Hellen,—Xouthus, the son of Hellen, being the father of Ion and Achaeus. But, as such statements are as virtually nomadic tribes; and the story even went that they received their name, Pelasgi—Pelargoi, or Storms, from their wandering habits. It is difficult to resist the inference of Sir G. Cornewall Lewis that this radical inconsistency in the views respecting the Pelasgians is a proof that they rest on no historical basis (Credibility of Early Roman History, i. 282). Further, there is the extreme unlikelihood that the tribes afterwards known as Donans should for a certain period have been called Macedonians, or rather, as Herodotus implies, that they should move more than once from their name. The assertion that they were called Macedonians involves a fresh contradiction, for elsewhere Herodotus asserts that the Macedonians were not Hellenic at all, although they were governed by chiefs of genuine Greek descent. Nor is our position improved if we choose to prefer the statements of the genealogies to the preference to those of Herodotus or other historians, on the ground that the national tradition by which these genealogies were handed down must be trustworthy, for the descent in one genealogy is often directly contradicted by that of another, and not unfrequently, and indeed even generally, the genealogy betrays the nature of the materials from which it has been made up. Thus, for instance, Dorus, the eponymus of the Dorians, has as his sister Protogeneia (the Early Dawn), who, being wedded to Zeus, the god of the gleaming heaven, becomes the mother of Aethlius, the toiling sun, who is the father of Endymion, that is, of the sun-god who asks to sleep in Latmus, the land of forgetfulness. Finally, we have to note the fact that, in the Hellenic world as elsewhere, tribes bearing the same name were found separated by great distances; and in such cases traditions always sprang up, not merely asserting their connection, but also fabricating such traditions as the Achaeans in Thessaly and Achaeans in the Peloponnesus; and it was said, not merely that the former passed southwards across the isthmus of Corinth, but that they were led by the barbarian Pelops from Phrygia. The same process connected the Peloponnesian Dorians with the Dorian clans who dwelt between Cita and Parnassus, and spoke of the latter as the stock from which the Spartans sprang, to the great benefit of the insignificant clan, who thus acquired a foremost rank in the Hellenic world.

All that we can do, then, is to bring together the genealogies which refer in any way to Dorus and his supposed descendants the Dorians, and then gather from historians and geographers the various regions in which Dorians were found during ages which may reasonably be regarded as historical. The result of the former process will scarcely appear satisfactory. We have noticed one genealogy which represents Dorus as the son of Hellen; but in the Eolian genealogy he is the son of Apollo and Puthis, and is slain by Aetolus in the land which from him was called Aetolia (Grube, Hist. Gr., i. 140). The great tradition which connects the Dorians of the Peloponnesus with their more noteworthy namesakes is the legend which relates the return of the Heraclids, or descendants of Heracles, who, after the death of that hero, had been compelled to take refuge in Athens. Hyllus, in this exile, as adopted by the Dorain king, Latmus, the father of Pamphylus and Dymna, who with Hyllus became the eponyms or name-givers of the three tribes found in Dorian communities generally, and known as Hyllleans, Pamphylians, and Dymnians, Hyllus being more particularly illustrious as the forefather of Eurybathe and Procles, the progenitors of the two houses from which the Spartan kings were always elected. But this legend, like the rest, was variously related, and, according to the version of Plato, the return of the Heraclids would be rather a return of the Achaeans to the Peloponnesus.

We cannot, however, question the fact that the Dorian race was widely extended, that it was found, like the Ionians, in various portions of the Hellenic world, separated by considerable distances of land or sea, and that the people who bore this name were singularly active in the work of colonization. They are found not only in all parts of the Peloponnesus but in the islands of the Aegean, and on the coasts of Asia Minor; and from the foremost Dorian cities went forth, it is said, the colonists who were to carry the Hellenic name and Hellenic culture far to the east and the west. Thus Corinth became the mother city of Corcyra and Syracusa, and from these sprang EpiGLISHUS, Camarina, Ambracia, Potidaea. The Dorians of Crete and Rhodes sent forth the settlers of the Sicilian Gela, and Gela in turn became the parent of the neighboring Acraga, or Agrigentum, while to Megara is assigned the origin of Byzantium, the chief culture home of Romans and of Ottoman Sultans. These several communities exhibit a general likeness in their dialect, their art, and their polity. Their civilization assumed a magnificent phase in the splendour of Corinth and the great Dorian cities of Italy and Sicily. Their powers of resistance were attested by the success with which their colonies were planted in regions occupied by powerful and hostile tribes, who failed to overthow them simply because they lacked the Dorian power of cohesion. Yet with the Dorians this power was subjected to strictly defined bounds of action. All Dorian cities might feel a pride in belonging to the great Doric stock, and the city which claimed certain prerogatives in its colonies; but each city was for them nevertheless an absolute unit, with whose independence no other city had any right to interfere, even though this interference might have for its object the establishment of a pan-Hellenic union. Any movements in this direction were sure to raise the keenest and most persistent opposition of the Doric Greeks, and thus we can understand the nature of the quarrel which was fought out between Sparta and Athens, and which ended in the ruin of the great Ionian city, whose imperial rule must otherwise have checked, and may perhaps have rooted out,
this fatal instinct of isolation. The Spartans, who stood at the head of the Dorian portion of the Greek world, are regarded by K. O. Muller, in his History of the Dorians, as exhibiting in their institutions and government the true type of the race. This theory is strenuously combated by Grote, History of Greece, p. ii. ch. 6; and at the least it must be said that if they displayed the true Dorian type, that type must have been completely lost among all the other Dorian tribes. The Spartans occupied Laconia strictly as an army of occupation, and carrying out inflexibly their rigid system, they opposed an uncompromising resistance, not only to luxury, but generally to art, refinement, and speculation (Cox, History of Greece, L. 72). No such condition of things is found even in Crete, from which Sparta was supposed to have derived her special institutions. Not only is their reputation as models of Dorism altogether undeserved, but it probably would have been exceedingly distasteful to the countrymen of Leonidas, Archidamus, and Agesilaus. (G. w. c.)

A short few miles to the S. is to be ascribed to the board. The only other Greek communities in like plight were those of Arcadia or both Doris and Arcadia remained king. S.

S. of Doris altogether undeserved, but strictly as an army of occupation, and carrying out in the rear of the invasion of Xerxes we know nothing, Ermeus, and then the they had none; nor is there more to be said than that they here by the late Thomas Hope, the author of a handsome edifice rebuilt in 1873; and and on the east, of the Etohans on the west, Locrians on the south, the whole being barely thirty miles in length by ten at its greatest width. The inhabitants were divided into the four townships of Boion, Cythion, Erneaus, and Fundus. Of their history down to the time of the invasion of Xerxes we know nothing, and probably they had none; nor is there more to be said than that they have consulted their interests by submitting to the Persian king. This confederacy of four little townships was honoured by the Spartans as their metropolis, or the home from which the Dorians had come who achieved the conquest of the Peloponnesus—a tradition which has been noticed in the article Dorians. The political insignificance of Doris is to be ascribed to the fact that it had no seaboard. The only other Greek communities in like plight were those of Arcadia or the Peloponnesian highlands, and both Doris and Arcadia remained far in the rear of Hellenic development generally.

DORKING, a market town of West Surrey, England, situated on a small brook, a tributary of the Mole, 29 miles S. of London by rail. The town is well built and clean, and occupies a picturesque position in a sheltered vale near the base of Box Hill. The parish church of St Martin's is a handsome edifice rebuilt in 1873; and St Paul's district church, erected in 1857, is a building of some pretension. Lims of exceptionally good quality is burnt to a large extent in the neighbourhood, and forms an important article of trade; it is derived from the Lower Chalk formation. Dorking has long been famous for a finely-flavoured breed of fowl, distinguished by their having five claws. Several elegant mansions are in the vicinities of the town, notably that of Deepdene, containing a gallery of sculpture collected here by the late Thomas Hope, the author of Anatomist. The Roman road which crossed from the Sussex coast to the Thames, passed close to Dorking. The population of town is about 4800; that of parish in 1871 was 8367.

DORLEANS, Louis, (1542–1629), a minor French poet and political pamphleteer, and a prominent partisan of the Catholic League, was born in 1542, probably at Paris, though one of his biographers states that Orleans was his birthplace. He studied under Jean Daurat, and after taking his degree in law began to practise at the bar with but slight success. He added little to his reputation by writing the poems, and it was only after the daring step of arresting the royalist members of parliament, that he was brought into prominence by being appointed its advocate-general. He maintained the position and claim of the League in language that was always strong and often insolent, going so far as to express regret that the king of Navarre and the prince of Condé had not been assassinated. He was, however, courageous enough to intercede with the duke of Mayenne for the inhabitants of Paris, but without effect. After this failure he continued the publication of violently-worded pamphlets intended to render the accession of Henry impossible. One of these, Le Banquet et Après-dîne du Comte d'Arville, in which he accused Henry of insincerity in his return to the Roman Catholic faith, was so scandalous as to be disapproved of by many members of the League. When Henry at length entered Paris Dorlés was among the number of the proscribed. He took refuge in Antwerp, where he remained for nine years. At the expiration of that period he received a pardon, and returned to Paris, where he had not been long before he was imprisioned for sedition. The king, however, had determined to set him free after he had been three months in the Conciergerie, and this generous conduct had the effect of attaching him ever afterwards to the cause of Henry. His last years were passed in obscurity, and he died in 1629 at the age of eighty-seven. Dorlés's political pamphlets are now exceedingly scarce. His chief poem, Énarré (Paris, 1572), is a poor imitation or translation of part of the Orlando Furioso.

DORMOUSE, the common name of a family of small rodents (Myoxidae), generally regarded as intermediate between mice and squirrels. It contains 12 species, distributed over the temperate parts of the great Palearctic region from Britain to Japan, and throughout the greater portion of Africa. The Common Dormouse (Myoxus avellarius) occurs in most parts of Europe, and is the only species found in Britain. It is an active little creature, measuring about three inches long, with a thick bushy tail of nearly similar length. Its posterior legs are slightly longer than those in front, and both face and hind feet form prehensile organs, whereby the dormouse climbs along the twigs of the low bushes among which it lives, and in which it builds a neat round nest formed of leaves. It is a shy and timid animal, choosing the recesses of woods for its habitation, and seldom showing itself by day; in confinement, however, it is readily tamed and becomes very familiar. It feeds, as its specific name implies, on hazels, and is also partial to berries, haws, and grain. These it eats, either sitting on its haunches or suspended by its hind feet, and holding them between its forepaws like a squirrel. In autumn it grows very fat, and lays up a store of food for winter use,—retiring at the commencement of the cold season to its nest, and curling itself up into a ball, when it becomes dormant. A warmer day than usual restores it to temporary activity, and then it supplies itself with food from its autumn hoard, again becoming torpid till the advent of spring finally rouses it. Owing to this hibernating habit it is known as the Sleeper, while the name dormouse has reference to the same peculiarity. The young of the dormouse are generally four in number, and these, according to Bell, are produced twice a year. They are born blind, but in a marvellously short period are able to eat for themselves, and their hibernation begins later in the season than with the adult form. The fur of the dormouse is of a tawny colour above, and paler beneath, with a white patch on the throat. The Fat Dormouse (Myoxus gills) is larger than the British species, and is the one most commonly found in Southern Europe.

DORNBERN, or Dornbrunn, a straggling but well-built town of Tyrol, situated in the Leutasch valley, six miles S. of Bregenz, situated on the right bank of a stream known as the Dornbirn Ach, which flows into the Lake of Con-
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DOROBOUSH, a town of Russia in Europe, in the government of Smolensk, about 55 miles E. of the city of the same name, on the banks of the Dnieper, in 54° 55' N. lat. and 33° 17' E. long. It has twelve churches, and still preserves its ancient earthen fortress, with its ramparts and ditch, within the precincts of which are situated the cathedral, the courthouse, and two victualling stores. Its manufactures are of no importance, but it maintains an extensive trade with various parts of Russia, and even with foreign countries, in tallow, leather, and hemp. First mentioned in 1300 as the object of a contest between Alexander of Smolensk and Andrew of Viasna, Doroobush continued through the 13th century to share in the vicissitudes of the neighbouring principalities, passed in the 15th successively into the power of the Lithuanians and the Poles, and was finally united with Russia in 1667. It was partially burned by the French on their retreat from Moscow. Population in 1873, 7905 of whom only a very few are Catholics and Jews.

DOROGOGR, or Dorono, a town of Roumania, in the northern part of Moldavia, about 80 miles north-west of Jassy, on the Shaska, a tributary of the Pruth. It has about 10,000 inhabitants, a large transit trade with the products of Northern Europe, and several important annual fairs; but its buildings are of a poor description.

DOROHHEUS, a professor of jurisprudence in the law school of Berytus in Syria, and one of the three commissioners appointed by the emperor Justinian to draw up a book of Institutes, after the model of the Institutes of Gaius, which should serve as an introduction to the Digest already completed. His colleagues were Tribonian and Theophylus, and the work was accomplished in 533. Dorotheus was subsequently the author of a commentary on the Digest, which is called the Index, and was published by him in 542. Fragments of this commentary, which was in the Greek language, have been preserved in the Covlta, appended to the body of law compiled by order of the emperor Basilus the Macedonian and his son Leo the Wise, in the 9th century, known as the Basilica, from which it seems probable that the commentary of Dorotheus contained the substance of a course of lectures on the Digest delivered by him in the law school of Berytus, although it is not cast into a form so precisely didactic as the Index of Theophylus.

DORP, a town of Russia, in the government of Dusseldorf, 17 miles north-east of Cologne, which, like Barmen and many other towns in the valley of the Wupper, has since 1849 rapidly grown into importance as a centre of manufacturing industry. Tobacco, paper, steel, and iron wares are the principal objects of its activity. In 1872 the population amounted to 10,689.

DORPAT, in German frequently Dorpt, in Russian Derpt or Yaroslaff, in Estonian Tartoma, a city of Russia in Europe, in the government of Livonia, situated on both banks of the Embach, 157 miles north-east of Riga, in 59° 23' N. lat. and 26° 23' E. long. The principal part of the town lies to the south of the river, and the more important buildings are clustered round the two eminences known as the Donberg and the Schlosberg, which, in the Middle Ages, were occupied by the citadel, the cathedral, the episcopal palace, the monastery, and the houses of the wealthier inhabitants. Owing to the great conflagration of 1777, the actual town is almost entirely of modern erection; and its fortifications have been transformed into promenades. Besides one Roman Catholic, three Lutheran, and two Russian churches, a hospital, and an orphanage, a veterinary institute founded in 1846, the economical society of Livonia, an Estonian learned society, and a medico-surgical society, it possesses a famous university, with an observatory, a botanical theatre, a botanical garden, and a library of about 250,000 volumes, which are housed in a restored portion of the cathedral, burned down in 1596. This university, which renders the town the great intellectual centre of Livonia, preserves the Teutonic traditions of its earlier days, and is much more German than Russian in its culture. It was founded by Gustavus Adolphus in 1632, but in 1699 teachers and students removed to Parnau on the advance of the Russians, and on the occupation of the country by Peter the Great again took flight to Sweden. In spite of the stipulation of the treaty of 1710 and the efforts of the Livonians it was not till 1802 that its restoration was effected under the patronage of Alexander I; but since that date its history has been one of considerable prosperity. It possesses 42 ordinary professors, a total teaching staff of 73 members, and upwards of 7000 students. The astronomical department is especially famous, owing partly to the labours of Otto Struve, and partly to the possession of Fraenhofer's great refracting telescope, presented by the emperor Alexander I. The town is still a centre of learning, and much manufactures.

D'ORSAY, ALFRED GUILLAUME GABRIEL, COUNT (1798-1852), a celebrated leader of society in Paris and London, who added to the attractions of dandyism those of high intellectual and artistic gifts, was born at Paris in 1798. He was the son of General D'Ossay, from whom he inherited the exceptionally handsome person which contributed so much to his social success. Through his mother he was grandson by a morganatic marriage of the king of Wurttemberg. In his youth he entered the French army, and served as a garde du corps at Wurttemberg. In 1821 he was appointed to the staff of the Duke of Lorraine, and stationed at Venice on the Rhone, he formed that acquaintance with the earl of Blessington and his family which affected the whole course of his future life. The acquaintance quickly ripened into intimacy, and at the invitation of the earl he accompanied the party on their tour through Italy. In the spring of 1822 he met Lord Byron at Genoa, and the published correspondence of the poet at this period contains numerous references to the count's gifts and accomplishments, and to his peculiar relationship to the Blessington family. A diary which D'Ossay had kept during a visit to London in 1821—2 was submitted to Byron's inspection, and was much praised by him for the knowledge of men and manners and the keen faculty of observation it displayed. On the 4th December 1827, Count D'Ossay married Lady Harriet Gardiner, a girl of fifteen, the daughter of Lord Blessington by his first marriage. The union, if it ripened his character, made the Blessington family less ostensibly equivocal than before.
was in other respects an unhappy one, and a separation took place soon after the death of Lord Blessington, which occurred in 1839. When the widowed countess returned to England she was accompanied by Count D'Ossay, and the two lived under the same roof, first at Seacombe Place and then at Kensington Gore. Their house soon became a resort of the fashionable literary and artistic society of London, which found an equal attraction in host and hostess. The count's charming manner, brilliant wit, and artistic faculty were accompanied by benevolent moral qualities, which endeared him to all his associates. His skill as a painter and sculptor was shown in numerous portraits and statues representing his friends, which were marked by great vigour and truthfulness, if wanting the finish that can only be reached by persistent discipline.

Count D'Ossay had been from his youth a zealous Bonapartist, and one of the most frequent guests at Gore House was Prince Louis Napoleon. It was to Paris, therefore, that he naturally resorted in 1849, after the breaking up of the establishment at Gore in consequence of his bankruptcy. The countess of Blessington, who had accompanied him, died a few weeks after their arrival, and he endeavoured to provide support for himself by adopting the profession of a portrait painter. He was deep in the counsels of the prince president, but the relations between them was less cordial after the coup d'etat, of which the count had by anticipation expressed his strong disapproval. His appointment to the post of director of fine arts was announced only a few days before his death, which occurred on the 4th August 1862.

Much information as to the life and character of Count D'Ossay is to be found in Maiden's "Literary Life and Correspondence of the Countess of Blessington" (1865). Plate IV.

DORSET, an English county, situated on the south-western coast. In British times, previous to the landing of Caesar, it was inhabited by a tribe which Polyaenus calls the Durotriges, and which, upon no good authority, but not without probability, has been identified with the Marns, the occupants of a part of the opposite coast (extremi hominum Marns, &c. viii. 727), the two appellations being apparently of similar import, and referring to their location on the sea-shore. Under the Romans this country constituted a portion of Britanniae Minor, and the Saxons called it Dorseta, or Dorseta (a word involving the same root, Dwr, water), and included it in the kingdom of Wessex.

On the north Dorsetshire is bounded by Somersetshire and Wilts, on the east by Hampshire, on the west by Devonshire and a part of Somersetshire, whilst the British Channel washes the whole of its southern coast. Its form is very irregular; the northern boundary has a considerable angular projection in the middle; its southern coast runs out into various points and headlands; and the western inclines towards Devonshire with an uneven line. Its greatest breadth from north to south is about 35 miles, and its length from east to west 55. Its circumference, including 627,255 acres, is nearly 160 miles. In 1871 the population was found to be 195,537—having increased from 114,452 in 1801 and 175,054 in 1841. 111,731 acres were under corn-crops, and 60,653 under green-crops. The males numbered 99,618, the females 99,921.

Dorset is divided into 35 hundreds, containing more than 300 parishes, 8 boroughs, 22 liberties, and 12 market towns, the principal of which are Dorchester, Bridport, Sherborne, Lyme-Regis, Shaftesbury, Weymouth and Melcombe-Regis, Poole, and Blandford. Only 10 members are returned to parliament, instead of 20 as before the first Reform Act. The county itself sends three; Dorchester, Bridport, Poole, Shaftesbury, and Wareham one each, and Malcombe-Regis and Weymouth two between them. Dorsetshire forms a part of the sea of Salisbury. It originally fell under the wide jurisdiction of the ancient sees of Dorchester in Oxfordshire and of Winchester, till the foundation of the bishopric of Sherborne, 765 A.D., and when that see was transferred to Salisbury it still remained a part of it, till in 31st Henry VIII it was annexed to the newly-erected bishopric of Bristol, and so continued till 1836, when its ancient connection with Salisbury was revived, and still continues.

Branches of the London and South-Western Railway, or in connection with it, enter the county from Southampton, Salisbury, and Bath, meet near Wimborne, and continue to Poole, Weymouth, Dorchester, and Weymouth, which last two places are also reached by a branch of the Great Western from Yeovil, with a drop-line to Bridport at Maiden-Newton. The main line of the London and South-Western likewise touches the north of the county near Weymouth, Gillingham, and Wimborne.

The surface of Dorsetshire is hilly and uneven. Throwing out for the present the consideration of the coast-line in Purbeck, Portland, and to the westward, and proceeding in the direction of from S.E., to N.W., we find a descending series of formations, commencing from the Tertiaries, which occupy an almost equilateral triangle, and include the towns of Wareham, Poole, Wimborne, and Cranborne; passing through a band of Chalk some ten or twelve miles in breadth, in which the chief town Dorchester and Blandford are situated, and which is fringed by a thin belt of Greensand; and thence to the Culmbe beds in the north-east, and the sands at Bridport and the south-west. The three systems thus roughly indicated have been popularly divided into the Sands, the Chalks, and the Clays. It is, of course, the last which has won for this county the somewhat exaggerated, and not uncontested, designation of "the garden of England," though the rich wide vale of Blackmore, and the luxuriant pastures and orchards of the extreme west may fairly support the claim. The Downs of the Chalk district, formerly so celebrated as sheep-walks, have been rapidly disappearing of late years under the influence of a more scientific system of agriculture, though still the stock of sheep pastured in the county amounts to between 600,000 and 600,000. Even in the sandy region, cultivation is advancing, and detached portions are improved, though there is still much waste land, dreary and barren, hardly supporting, even in the summer months, a few sheep and cattle, and supplying the scattered cottars with heath and turf for fuel.

Dorsetshire is not generally speaking a well-wooded county, though much fine timber may be seen, not only in the richer and deeper soils, but elsewhere in the sheltered valleys of the Chalk district, and more especially upon the Greensand. The views from some of the higher hills, which constitute, as it were, the back-bone of the county, are often vastly extensive, ranging on many points from the Needles to the very verge of the Mendip and Quantock Hills, where they sink into the Bristol Channel.

The Dorsetshire air is remarkably mild and salubrious, and in some summer spots of the coast, such as Abbotsbury, even tropical plants are found to flourish. Weymouth has long been celebrated as a watering-place, and owing to the general calmness of the sea there, its pleasant situation, and commodiousness for bathing, still it maintains considerable consequence. The sea-side villages of Swanage, Lulworth, and Charmouth also, though more difficult of access, and affording less accommodation for visitors, abound with many quiet and enjoyable charms.

The chief port of the county is Poole, situated on an estuary formed by the mouth of the Frome. Its entrance is defended by Brownses Castle, — not, however, a military fort.
DORSET

pet, but simply a castellated mansion,—and it is very secure in all winds. It was formerly the chief place for equipping ships for the Newfoundland fishery, and a brisk trade was carried on from it with Spain, Portugal, and the Mediterranean; but it is now chiefly occupied with a coasting trade, and the export of potter's clay. Swanage, Weymouth, Bridport, and Lyme have harbours capable of admitting small vessels only. The magnificent breakwater at Portland, of which the first stone was laid by Prince Albert in 1849, provides a harbour of refuge which is nearly land-locked, and a secure anchorage of almost unlimited extent, and of easy access to the largest class of vessels.

The principal rivers of Dorsetshire are the Frome, the Stour, the Piddle, and the Ivel. The Frome rises in the north-western part of the county, near Everditch, and passing by Dorchester, reaches Poole, and falls into its bay. The Stour enters this county from Wilts'hire, near Gillingham, and, pursuing a southern and south-eastern direction, enters Hampshire. The Piddle rises in the north, and, flowing to the south-east, falls into Poole Bay. The Ivel, anciently the Yeo, has its source from several springs near Horethorn, in a hill north-east from Sherborne, from which town it flows into Somersetshire, and falls into the Parrett, near Yeovil.

Although neither coal nor any metallic ores have ever been found in Dorsetshire, the stone quarries of Purbeck and Portland have long been celebrated Purbeck, though called an island, is more properly a peninsula, of an irregular oval form, about twelve miles in length and seven in breadth. It consists, according to Mantell, of Cretaceous, Wealden, and Oolite strata in their regular order of succession, and highly inclined in their direction towards Swanage Bay, where they are easily detected. At Handfast Point the chalk is discovered, its lower division dipping at a considerable angle; then comes a layer of firestone, next gault, and then greensand—all inclined, then, at Swanage Bay, a thick widden bed, to the south of which are the Purbeck Hills, with their peculiar strata, and, a little further on, the Portland Oolite. The soil is altogether calcareous, and for the most part a continuous mass of either white or a brownish limestone, the latter having a mixture of shell-shales. The quarries on the south side of the island afford an inexhaustible fund of natural curiosities. The best quarries are at Kingston, Worth, Langton, and Swanage. The Swanage stone is white, full of shell, takes a polish, and looks like alabaster. All over the heaths, both here and on the mainland, blocks of indurated Tertiary grit, commonly called firestone, are found, and have been occasionally employed in the building of some of the neighbouring churches; and at Downsbay and Quay, in the parish of Worth, and elsewhere, the beautiful Purbeck marble, so conspicuous in the monuments and shafts of many of our cathedrals and finest churches of the 13th century, and now often sought for their restoration, has been extensively quarried. One of the most valuable products of Purbeck is a white clay used for making pipes, and very largely applied to the manufacture of china. Large quantities of it are dug, and many vessels loaded with it for Staffordshire in the port of Poole.

The Isle of Portland, as it is called, is also a peninsula, rising at its highest point, the Verno, to nearly 500 feet above the sea-level, and sloping gradually to near the water's edge at its extreme southerly point, the Bill. Its famous quarries, about 100 in number, are scattered in directions rather heaps of rubble and unsalable stone. They are Crown-property, and, except where the stone is taken for Government purposes, are leased to various firms, who pay a royalty of so much per ton. Some 50,000 tons are annually raised and exported. The stratum of stone that is worked for sale lies nearly parallel with the upper surface of the island, and without much earth or rubbish on it. The Portland stone (or freestone as it is sometimes called) is well known for its almost white colour, and as composing the materials of the most splendid erections in London, as well as in other parts of the British empire. The connection of Portland with the mainland occurs at some 10 or 11 miles' distance, at Abbotsbury, where a most remarkable beach of raised shingle, called the Chesil (Anglo-Saxon Chesell) or Pebble Beach, touches the shore, being thus far separated from it by a narrow estuary, famous for its swannery, called the Fleet.

The entire length of the beach is from 16 to 18 miles, with an average height of about 40 feet, and a breadth of some 180 or 190 yards, the pebbles constantly decreasing in size from 1 to 3 inches in diameter at Portland, to the size of peas at its termination.

Agriculture throughout the county has made very important advances within the last few years—steam-cultivation and improved implements having been largely introduced, and the growth of root-crops abundantly stimulated by the use of artificial manures. The precious crops of flax and hemp for the supply of the rope and twine works of Bridport are less cultivated than formerly. On the larger farms in the Chalk district a peculiar custom prevails of under-letting the daunes at so much per cow, the farmer finding the stock and the food, and the dairyman disposing of the produce. The horned sheep of Dorsetshire, long celebrated, have now become established as a useful and lucrative breed. Professor Bell, in his History of British Quadrupeds, gives a figure of this, as the typical English sheep, of "a handsome, though somewhat old-fashioned breed, principally esteemed for its producing lambs earlier than any other in this country." "To the eye of him who seeks for beauty in harmony and proportion (he adds) this sheep is one of the handsomest in any part of England. The strong well-formed body and limbs, the clear white fleece, the finely-curved horns, and other points will to him constitute a more pleasing combination of character than is to be found in those breeds which have become more changed from the old stock by repeated transmission of peculiarities, which, however advantageous to the breeder, whether for the sake of the fleece or the flesh, cannot be considered as adding to the abstract beauty of the animal." There are still many fine flocks of this characteristic breed existing in the county, though many farmers prefer the Southdowns or Hampshires, as better adapted to their particular holdings. There is a small breed in Portland, which fattens too highly upon richer pastures, but the mutton of which is an especial dainty, weighing only about 8 lb. a quarter.

The old hardy race of long-horned cattle, formerly common in the hilly districts, are fast disappearing, and Devon, short-horns, and Herefords are almost exclusively now bred. Great quantities of butter are sent to the London market. The skimmed-milk cheese is often much esteemed, though little of it is exported from the county.

Vast numbers of mackerel are taken near Abbotsbury, and along the shore from Portland to Bridport. The season for taking them is from the middle of March till midsummer, in nets or seine nets.

The manufactures of Dorset are not extensive. The principal are those of flax and hemp in the neighbourhood of Bridport and Beaminster, and of pottery and tiles in Bridport. The district near Poole, in which the most of them are made, is also called, and also gloving, are carried on in some of the villages, but the manufactures of lace, and of thread-buttons, formerly flourishing at Blandford and elsewhere, may be said to be now entirely obsolete. At Sherborne these industries have been succeeded by extensive silk-mills.
DORSET

Few, if any, parts of England possess a more abundant treasure of prehistoric remains, than are to be found throughout this county, though the grander monuments of the Roman occupation have not produced the same result. In the flat and fertile districts, where cultivation has been most complete, the manifestations of their former abodes are often surprisingly evident. Vestiges of peaceful British occupation may constantly be traced on portions of the Downs, where and there are still uncultivated, whilst a series of magnificently-fortified camps is found wherever the most prominent heights, and probably served as camps of refuge for the harried tribes and their cattle in times of war and invasion. The grandest of these, called Maiden Castle, is supposed to be the Dumnon of Ptolemy, the stronghold or Acropolis of the Durotriges, whose gigantic ramparts may be seen outlined against the sky between the Weymouth and Bridport roads, about two miles south from Dorchester. Its inner area covers about 44 acres, its outer area about 116, the difference being absorbed in its stupendous double, and sometimes triple, entrenchments, some 60 feet high, and extraordinarily steep. Other grand examples of these hill-fortresses may be seen at Egerton and Filsdon to the westward, at Chaldon and Flowers-barrow to the eastward, and at Rawlbury, or Bulbarrow, Hod (including an equilateral Roman camp), and Hameldon, overlooking the valley of the Stour, and at Badbury, Woodbury, &c., in the more central parts of the county. It has been conjectured with great probability that some of these last were among the oppida subdued in the expedition of Vespasian: and it is not unlikely that in that remarkable chain of tumuli, or barrows, which are visible along the crest of the Ridgeway, now tunnelled for the lines of railroad which connect Weymouth and Dorchester, may have been deposited the ashes of certain nameless heroes who fought the battles either of invasion or resistance. Such barrows are widely distributed elsewhere through the county, and when opened have usually been found to contain little more than burnt bones, corroded metal, and rude cinerary urns, with occasional marks of subsequent Roman interments. A few monoliths, cromlechs, and stone circles have also been recorded.

Of the period of Roman occupation many relics exist. The Via Icenana, or Icknield Street, with various vicinal offshoots, passes through the centre of the county, and connects its chief town Dorchester, or Durnovaria, with Old Sarum and Exeter. An indisputable though scanty fragment of the Roman wall of Dorchester still exists, and the avenues, called the walks, which surround the town appear to follow its ancient course, the trees being planted sometimes on the easter and sometimes in the vaultum. A tesselated pavement, some 20 feet square, was exhumed in 1858 in the grounds of the county prison, and is preserved in its chapel; and various fragments of a similar character, as well as many coins of the later emperors, and other metallic and fictile antiquities, have been and still are not infrequently brought to light, wherever the ground is disturbed. Roman pavements have been found elsewhere,—one at Rampisham in 1795, one at Frampton of unusual size and beauty in 1794, and others at Weymouth, Sherborne, Dewlish, &c. The amphitheatre at Dorchester railway station has been generally attributed to the time of Agricola, and constructed very probably for the amusement of the Roman soldiers by the enforced labour of their captives. It is more perfect than any other remaining in this country, and has been calculated to suffice for nearly 13,000 spectators. The Roman stations in Dorsetshire which antiquarians pretty nearly agree in identifying are Loundini or Loundina, Lyme Regis; Caen-Arica, Charmouth; Durnovaria, Dorchester; Caunton, Weymouth, or a place in the immediate neighbourhood; Monton, or Hamworthy; Bolsehano, Poole; Bindollast, Wimborne, or (Sir R. O. Hoare) GussageCheckout; Iernona, Bere. Of medieval castles no consider-
Cicely, daughter of Sir John Baker of Sissinghurst in Kent, and in 1557 he entered public life as member of parliament for Westminster. In the following year he sat for Euston Grinstead in Sussex, and the record of his activity is still to be found in the Journals of the House of Commons. Queen Elizabeth, who had just come to the throne, was attracted by the handsome person, high culture, and evident ability of her young poet-kinsman, who was accordingly, to quote his own words, "selected to a continual private attendance upon her own person," which did not, however, prevent him from appearing again in the Parliament of 1563 as member for Aylesbury in Buckinghamshire. A visit to the Continent in 1565 was interrupted by an unexplained imprisonment at Rome, and terminated by the news of his father's death, which took place on 21st April 1566. On his return he was knighted in the queen's presence, and obtained the title of Lord Buckhurst, by which he continued to be known though the most of his life. Apartments were provided for him in the queen's palace at Shene, where his mother was in charge, but the simplicity of his mode of life is shown by the fact that, when in 1568, he had to entertain Odet de Coligny, Cardinal de Châtillon, at the queen's command, he failed to satisfy the luxurious desires of his guest, and thus fell under her majesty's displeasure. In 1571 he was sent to France to congratulate Charles IX. On his marriage with Elizabeth of Austria in 1575 he was one of the poets who tried Thomas Howard, earl of Norfolk; and in 1586 he was employed to convey to Queen Mary of Scotland the sentence of death. A more difficult task was found for him in 1587, as ambassador to the Hague he was expected "to expostulate in favour of peace with a people who knew that their existence depended on war, to reconcile those to delay who felt that delay was death, and to heal animosities between men who were enemies from their cradles to their graves." With what fearlessness, fidelity, and sagacity he discharged his duty, has been told in detail by the historian of The United Netherlands, who asserts that there is not a single line in all the ambassador's correspondence which does not reflect honour on his name. But his expostulations with the queen on her paralyzing policy, and his independent conduct towards the royal favourites Leicester, procured him, on his return to England, instead of approbation and reward for his services, an order confining him to his house for nine or ten months in token of her majesty's displeasure. On the death of the earl, however, he was again received into favour; in 1588 he was presented with the Order of the Garter; in 1591 he was elected chancellor of the university of Oxford, his claims having been supported by a royal letter; and, in 1599, on the death of Lord Burghley, he succeeded to the office of Lord High Treasurer of England. In the following year he had to pronounce sentence as High Steward on the earl of Essex, who had been his rival for the chancellorship and his opponent in politics. The change of the dynasty which took place in 1603 left his position unimpaired, his office of Lord Treasurer was confirmed to him by King James, and on 13th of March 1604, he was created earl of Dorset. He died suddenly on April 19th 1608, while sitting at the council table in Whitehall, and left his earldom to his son Robert Sackville.

In the history of English literature Thomas Sackville occupies an honourable position. We no longer possess any of the "sonnets finely sauced" for which, in his student days, he was praised by Jasper Heywood, but we may still read the Ferrez and Ferrez by which he takes rank as the first writer of genuine English tragedy, the Induction to the Mirror of Magistrates, and the Complaint of Henry Duke of Buckingham. The first was written with the assurance of Thomas Norton, during Sackville's connection with the Inner Temple, was acted before Queen Elizabeth in 1591, appeared without the author's permission in 1595, and again in authorized editions in 1570–1 and 1590. The second is a stately allegorical poem of the kind so much in vogue in the reign of Elizabeth, with elaborate personifications of sorrow, death, old age, &c, intended to stand as preface to a series of poems descriptive of the tragic fates of famous men; and the Complaint was to form the first of the series. They all display a lively fancy, and no small command of pure and sonorous English, but hardly awaken any regret that the author soon laid aside the poet's for the diplomatist's pen.


DORSET, CHARLES SACKVILLE, SIXTH EARL OF (1657–1706), eldest son of Richard Sackville, the fifth earl, and Frances Cranfield, eldest daughter of Lionel, earl of Middlesex, was born January 24, 1637, and succeeded his father in 1677. His youth, spent partly in London and partly in Italy, was filled with all the make-up and libertine excesses of the period, but, owing doubtless to the nobler qualities which he none the less displayed, the graceful sobriquet found more favour with the public than the dissolute crew. He was high-spirited, generous, and humane, as years passed on his character ripened and refined, and he who had been the worthy rival of Charles II. lived to be laughed at by Dryden for fidelity to his wife. Though present as a volunteer under the duke of York during the Dutch war in 1665, and afterwards sent on more than one mission to the court of France, he took comparatively an unimportant part in politics until the commencement of the troubles which ended in the Revolution of 1688. Deceived in 1667 of his office as lord-tenant of Sussex, for his refusal to comply with James II.'s arbitrary demands, he soon after became one of the active members of the opposition, and in 1688 assisted the flight of the Princess Anne. After James had left the country, Dorset was a member of the council for the preservation of the public peace; and on William's accession he was appointed lord chamberlain. In 1691 he accompanied the new king to Holland, and, though he was afterwards involved in the accusations of infidelity brought forward by Preston, he retained and deserved the royal favour to the last. He died at Bath in January 1705–6, and was succeeded in the earldom by Lionel Cranfield Sackville, his only son by his second wife, Mary, daughter of James Compton, earl of Essex. Dorset keeps his place in the list of English poets in virtue of a few lyrical and satirical pieces, which, though extravagantly praised by his contemporaries, and, even according to Macaulay, displaying the easy vigour of Suckling and wit as splendid as that of Butler, are after all of no great moment in themselves, and only suggestive of what in happier circumstances the writer might have done. The best known is a pleasant careless song—To all you Ladies now at Lord—written at length shortly before that engagement with the Dutch, in which Admiral Opdam's ship was blown up. As a patron of literature, however, Dorset stands unrivalled,--judicious, impartial, and munificent. To him Prior was indebted for his education, Montagu for promotion, and Wycherly for support against the disfavour of the public. Though compelled bytlown Lord Chamberlain to deprive Dryden of his official laureate, he took care to make good from his private purse the pecuniary loss involved in the dismissal.

See Prior's dedication of his poems to the duke of Dorset; Johnson's Lives of the Poets; Walpole's Royal and Noble Authors; Macaulay's History of England, vol. i chap viii.

DORT, or DORDRECHT, an important commercial city of Holland, at the head of a district in the province of South Holland, 10 miles S.E. of Rotterdam, on the railway between that city and Breda. The island of the Meuse or Merwe on which it stands is said to have been separated
D O R — D O R

Dort, a town of Germany, capital of a circle of the same name, in the district of Arnsberg, and Prussian province of Westphalia, is situated on the Emscher, in 51° 31' 25" N. lat. and 7° 27' 9" E. long. Among the chief structures may be mentioned the large railway station, the workshop and factories of which give employment to upwards of 1000 hands, the Renoldskirche, with a choir built in 1421-1450, the old Marenkirche, and the Gothic Dominican church. To the W. of the station is one of the ancient linden trees of the Kongshoof, where the meetings of the supreme court of the formidable Verhandelung, or secret tribunal of the Middle Ages, were held. In the vicinity of Dortmund are coalworks, in the working of which several thousands of persons are engaged. Since the discovery of iron-ore in the coal district, in 1850, many forges and blast-furnaces have been erected. The manufactures include tobacco, iron and steel, machinery, porcelain, earthenware, oil and flour, woollen, linen, and cotton fabrics. In 1875 the town had 47 breweries, which furnished more than 65 millions of gallons of beer. The population in 1875 was 57,742.

Dortmund, the Thurtmann, Trutenma, Trutsmaria, Tremonia, and Dortmunde of early history, assumes importance in the year 806. In 1005 it was the scene of an ecclesiastical council, and in 1018 and 1250 of imperial diets. The town was walled in the 12th century, and in 1521-22 successfully withstood the troops of the archbishop of Cologne, who besieged it for 21 months. About the middle of the 18th century it joined the Hanseatic League. At the close of the Thirty Years' War the population had become reduced to 3000. In 1659 Dortmund lost its rights as a free town, and was annexed to Saxony. The French occupied it in 1806, and in 1808 it was made over by Napoleon to the grand duke of Berg, and became the chief town of the department of Ruhr. Through thecession of Westphalia by the king of the Netherlands, May 31, 1815, it became part of Prussia.

DOR, or John Dory (Zea faber), an Acantophyryan fish belonging to the family Scorbutula, held in such esteem by the ancient Greeks that they called it Zeus after their principal divinity. Its English name is probably a corrupt from the mainland in 1421, by an inundation which swept away 72 villages, and about 100,000 inhabitants. Concerning its origin there is no authentic information, but it is certainly one of the oldest cities of Holland, and probably dates from the 10th century. It was surrounded by walls in 1231 by Florent IV., count of Holland, who made it his residence, and granted it many important privileges. In 1437 the entire town, including the church of Notre Dame, founded in 1366, and other public buildings, was destroyed by fire. One of the first towns in the Netherlands to embrace the Reformed religion, and to throw off the yoke of the Spanish king, it was chosen in 1572 as the meeting-place of the deputies by whom the independence of the United Provinces was first asserted; and in 1618 and 1619 it became intimately associated with the theological history of Europe, as the seat of the great synod which declared against the Arminian party. Among its celebrities are the De Witts and Ari Scheffer the artist. The town hall is a handsome building, and the principal church is an old Gothic structure 300 feet long by 125 wide, with a heavy square tower, and numerous monumental stones, some of great antiquity. The hall in which the synod was held is now demolished. The houses are generally of an antique fashion, with the gables turned outward, and many of them date from the period of the Spanish occupation. Dort possesses a good harbour, from which two canals lead to the centre of the town. It carries on an extensive trade in corn, flax, salt fish, wheat oil, and the timber which is brought down the Rhine, and it has shipbuilding docks, saw-mills, sugar-refineries, tobacco-factories, linen bleacheries, salt-works, and white-lead works. Population in 1850, 28,878, and in 1874, 25,577.

DORT, SYNOD OF, an assembly of the Reformed Dutch Church, with deputies from France, Switzerland, the Palatinate, Scotland, and England, called to decide the theological differences existing between the Arminians (or Remonstrants) and the Calvinists (or Counter Remonstrants), was held at Dort or Dordrecht in the years 1618 and 1619. During the life of Arminius a bitter controversy had sprung up between his followers and the strict Calvinists, led by Frances Gomar, his professional colleague at Leyden; and, in order to decide their disputes, a synodical conference was proposed, but Arminius died before it could be held. At the conference held at the Hague in 1610, the Arminians addressed a remonstrance to the States-general in the form of five articles, which henceforth came to be known as the five points of Arminianism. This conference had no influence in reconciling the opposing parties, and another, held at Delft in the year 1613, was equally unsuccessful. In 1614, at the instance of the Arminian party, an act was passed by the States-general, in which toleration of the opinions of both parties was declared, and further controversy forbidden, but this act only served, by roasting the jealousy of the Calvinists, to fan the controversial flame into greater fury. Gradually the dispute pervaded all classes of society, and in nearly all the towns both parties began to hold large meetings, and to indulge in threatening words and gestures, until finally, in Nov. 1617, Prince Maurice of Orange, in order finally to decide this controversy, called a synod which met at Dort in Nov. 1618. This synod was strictly national—called by the national authority to decide a national dispute, and not intended to have more than a national influence. The foreign deputies were invited to attend, only to assist by their advice in the settlement of a controversy which concerned almost the entire town alone, and which the Netherlands church alone could decide. At the fourth sitting it was decided to cite Simon Episcopius and twelve other Remonstrants to appear within 14 days before the synod; to state and justify their doctrines. It was also agreed to allow the Arminian deputies to take part in the deliberations, only on condition that they forbore to consult with, or in any way assist, their cited brethren, but this they refused. During the interval between the citation and the appearance of the accused, the professional members of the synod were instructed to prepare themselves to be able to confute the Arminian errors, and the synod occupied itself with deliberations as to a new translation of the Bible, for which a commission was named, made arrangements regarding the teaching of catechisms, and granted permission to the missionaries of the East Indies to baptize such children of heathen parents as were admitted into their families. At the 25th sitting Episcopius and the others cited appeared, when Episcopius surprised the deputes by a bold and outspoken defence of his views, and even went so far as to say that the synod, by excluding the Arminian deputies, could now only be regarded as a schismatic assembly. The Remonstrants were asked to file copious explanations of the five points in dispute, but objecting to the manner in which they were censured, they were, at the 57th sitting, dismissed from the synod as convicted "hars and deceivers." The synod then proceeded in their absence to judge them from their published writings, and came to the conclusion that as ecclesiastical rebels and trespassers they should be deprived of all their offices. The synodical decision in regard to the five points, and the sentence against the Remonstrants, was at the 144th sitting, read in Latin before a large audience in the great church. The Remonstrants were required to subscribe the condemnation, and many of them refusing were banished. The synod was concluded on 29th April 1619, by a magnificent banquet given by the chief magistrate of Dort.

DORTMUND, a town of Germany, capital of a circle of the same name, in the district of Arnsberg, and Prussian province of Westphalia, is situated on the Konschel, in 51° 31' 25" N. lat. and 7° 27' 9" E. long. Among the chief structures may be mentioned the large railway station, the workshop and factories of which give employment to upwards of 1000 hands, the Renoldskirche, with a choir built in 1421-1450, the old Marenkirche, and the Gothic Dominican church. To the W. of the station is one of the ancient linden trees of the Kongshoof, where the meetings of the supreme court of the formidable Verhandelung, or secret tribunal of the Middle Ages, were held. In the vicinity of Dortmund are collieries, in the working of which several thousands of persons are engaged. Since the discovery of iron-ore in the coal district, in 1850, many forges and blast-furnaces have been erected. The manufactures include tobacco, iron and steel, machinery, porcelain, earthenware, oil and flour, woolen, linen, and cotton fabrics. In 1875 the town had 47 breweries, which furnished more than 65 millions of gallons of beer. The population in 1875 was 57,742.

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tion of the French jaune doré, and has reference to the prevailing golden-yellow colour of the living fish. The body in the dory is much compressed, and is nearly oval in form, while the mouth is large and capable of extensive protrusion. It possesses two dorsal fins, of which the anterior is armed with long slender spines, and the connecting membrane is produced into long tendril-like filaments, while a row of short spines extends along the belly and the roots of the anal and dorsal fins. The colour of the upper surface is olive brown; the sides are yellowish, and are marked with a prominent dark spot, on account of which the dory divides with the haddock the reputation of being the fish from which Peter took the tribute money. It is an inhabitant of the Atlantic coasts of Europe, the Mediterranean, and the Australian seas. It is occasionally abundant on the coasts of Devon and Cornwall, and is also found, though more sparingly, throughout the British seas. It is exceedingly voracious, feeding on mollusks, shrimps, and the young of other fish; and Couch states that from the stomach of a single dory he has taken 25 founders, some 2½ inches long, 3 fatherlachia half grown, and 5 stones fish between an inch and a half in length. They are often taken in the fishermen's nets off the Cornwall and Devon coast, having entered these in pursuit of pilchards. They are seldom found in deep water, preferring sandy bays, among the weeds growing on the bottom of which they lie in wait for their prey, and in securing that they are greatly assisted by their great width of gape, by their power of protruding the mouth, and by the slender filaments of the first dorsal fins, which float like worms in the water, while the greater part of the body is buried in the sand, and thus they entice the smaller fishes to come within easy reach of the capacious jaws. The dory often attains a weight of 12 lb., although these usually brought into the market do not average more than 6 or 7 lb. It is highly valued as an article of food.

DOTIS. See Tots.

DOUAL, or DORAY, an ancient and once strongly-fortified town of France, at the head of an arrondissement, in the department of Nord, situated on the Scarpe, at a railway junction 18 miles S. of Lille. Its triple line of fortifications, partly the work of Vauban and partly of more modern structure, includes a considerably larger space than is requisite for the area of its buildings; the streets are consequently spacious, and the number and size of the gardens unusually large. Besides a variety of administrative offices, the town possesses a court of appeal, which holds its sessions in the palace of the ancient parlement of Paris; a collegiate church, founded by cardinal Allen, for the education of English Roman Catholic priests; the Government school of artillery, a school of drawing and music, a museum of natural history and antiques, enriched with sculptured stones and inscriptions from Bevans, a botanical garden, collection of paintings, and a public library of upwards of 40,000 volumes, and among the rest about 300 manuscripts. The church of Notre Dame dates from the 12th and 14th centuries, and preserves a remarkable painting, containing 254 figures, which formerly belonged to the abbey of Auch, and was apparently the work of an English artist. The museum, which contains a great number of curiosities, is still extant as an artillery magazine; and the town-house ranks as one of the historical monuments of France, and is architecturally interesting for its ogival windows and its belfry and spire. Railways and canals open up to Douai an extensive trade in corn, wine, brandy, cattle, wool, flax, and other agricultural products, and it manufactures lace, gauze, cottons, linens, thread, earthenware, soap, salt, and beer. The origin of the town is a matter of dispute, but it rose into importance in the Middle Ages under the Counts of Flanders, passed afterwards into the possession of the dukes of Burgundy, and thus became subject to the Spanish crown. In 1607 it was captured by the French under Louis XIV.; and though the allies under Marlborough and Eugene obtained possession in 1710, it was retaken by the French in 1711, and finally incorporated with France in 1714. Population in 1872, 21,703.

DOUARNENEZ, a town and watering-place of France, in the department of Finistère, to the S. of a bay of the same name. Its sardine fishery, which is carried on from the end of June to the beginning of December, gives occupation to about 800 boats, and between 3000 and 4000 men; the average number of sardines caught each year is 360,000,000, worth 9,000,000 francs. Population, 7180 in 1872.

DOUBLEDAY, Thomas, an English author in political and general literature. He early adopted the views of his friend William Cobbett, and was active in promoting the agitation which resulted in the passing of the Reform Act of 1832. As secretary of the Northern Political Union of Whigs and Radicals, he took a prominent part in forwarding the interests of Lord Grey and the reforming party. In 1838-59 he was a member of the council of the Northern Reform Union; and to the last he was a keen observer of political events. He succeeded his father as partner in an eminent firm of soap manufacturers at Newcastle, but devoted his attention more to literature than to mercantile affairs. On the failure of the firm he obtained the regentship of St Andrew's parish, Newcastle, a post which he held until appointed secretary to the coal trade. He died at Barnham, near Newcastle, December 18, 1870.


DOUBS, an eastern frontier department of France, so named from its chief river, is formed of the ancient German principality of Montbéliard (Montelpierch), and of part of the province of Franche-Comté. It is bounded E.S.E. by Switzerland, N. by the territory of Belfort and by Haute-Saône, and N.W. and S.W. by Haute-Saône and Jura, and lies between 45° 33' 10" and 47° 33' 43" N. lat., and 5° 3′ and 7° E. long. The surface is chiefly mountainous, four parallel chains of the Jura crossing it from S.W. to N.E. in the loftiest and most easterly chain the principal summit, Mont d'Or, has an altitude of 4800 feet, in the most westerly the highest points do not exceed 1000 feet. The river Doubs rises at the foot of the Noir Mont, in the arrondissement of Pontarlier, and, after twice traversing the department, passes through Jura, enters Sâone-et-Loire, and joins the Saône at Verdun, after a course of 257 miles. It is navigable from Yvovoycourt, near Montbéliard, to its mouth. Near Morteau it forms a cañon 88 feet in height. From Yvovoycourt to Dôle it constitutes a part of the navigable canal between the Rhone and Rhine. The Doubs is well watered by smaller rivers and rivulets. The climate, owing to the differences of elevation, is variable, but it is generally cold and rainy, and the waters are severe. The soil is stony and rocky, and at the higher levels there are numerous peat-bogs. The department may be divided into three regions. The highest, on which the snow usually lies
from six to eight months in the year, is in part barren, but on its less exposed slopes is occupied by forests of fir trees, and affords good pasturage for cattle. In the second or lower region the oak, beech, walnut, and sycamore flourish; and the valleys are susceptible of cultivation. The region of the plains is the most fertile, and produces wheat, rye, maize, hemp, pulse, and grapes and other fruits. Agriculture is in a backward state, but the increasing and drier farming receive much attention. Greyfriars receive to the value of seven millions of francs is produced yearly. The most important manufactures are watches, of which about 300,000 are annually made, cotton and woollen cloths, hardware, cutlery, paper, glass, and leather. There are several iron foundries, and distilleries for brandy and aleuthe; and the trade in cattle, hides, and timber is considerable. Among the mineral products are iron, coal, lignite, marble, building stone, gypsum, glass-sand, and grindstones. Doubs is divided into the arrondissements of Besançon, Pontarlier, Ronne-le-Dames, and Montbéliard, comprising 27 cantons and 629 communes. The capital is Besançon. Of the total area of 522,755 hectares (1,291,300 acres), about 462,353 acres are arable, 299,329 under wheat, 19,848 vineyard, 215,684 meadows, and 229,294 heath. The population in 1872 was 291,251.

DOUGLAS, Francis (1762–1834), an English antiquarian, born in 1762, was the son of one of the six clerks of Chancery. After completing his education he entered his father’s office, but quitted it after a short time, and devoted himself to the collection and study of antiquities. He became a prominent member of the Society of Antiquaries, and maintained an active correspondence with most of the leading antiquaries of his day. For a time he held the post of keeper of manuscripts in the British Museum, but he was compelled to resign it owing to a quarrel with one of the trustees. In 1807 he published his Illustrations of Shakespeare and Ancient Manners (2 vols. 8vo), which contained some curious information, along with a great deal of trifling criticism and mistaken interpretation. An unfavourable notice of the work in the Edinburgh Review greatly irritated the author, and made him unwilling to venture any further publications. He contributed, however, a considerable number of papers to the Archaeologia and Gentleman’s Magazine. In 1829 he published a Dissertation on the various Designs of the Dance of Death, the substance of which had appeared forty years before. He died on the 30th March 1834. By his will he left his printed books, illuminated manuscripts, coins, &c., to the Bodleian Library; his own manuscript works to the British Museum, with directions that they should not be opened until 1900; and his paintings, carvings, and miscellaneous antiquities to Sir Samuel Meyrick, who published an account of them, entitled The Dowonian Museum.

DOUGLAS, the commercial capital of the Isle of Man, and a favourite watering-place, stands on a fine semicircular bay on the east coast of the island, at the junction of the Dho and Glass, in 54° 10' N. lat. and 4° 26' W. long. The older streets, as usual with seaport towns, are irregular and narrow, but the modern ones, on terraces rising beyond the old town, are handsome and spacious. Among the public buildings may be noticed Castle Mona (now converted into a hotel), the “tower of refuge,” on a dangerous rock in the bay, the court-house, the house of industry, the public hospital, and the theatre, which has accommodation for 1000 persons. The ancient parish church of Brundian, partially rebuilt in 1773, has been replaced by a more modern building. There are four chapels and district churches—St Matthew’s, St George’s, St Barnabus’s, and St Thomas’s; and the Roman Catholics, Wesleyan and Primitive Methodists, Congregationalists, and Scotch Presbyterians also have places of worship. The salubrity of the climate, the peculiar characteristics of the surrounding scenery, and the cheapness of living render Douglas a favourite resort. There is communication daily in summer with Liverpool, Fleetwood, and Barrow, twice or thrice weekly with Ireland, and occasionally with Glasgow. The harbour is dry at low water; but vessels drawing not more than 10 feet may enter during neap tides, and those drawing not more than 14 feet during spring tides. A splendid new pier, at which passengers can land and embark at all heights of tide, was erected in 1872, and a spacious promenade, enclosing the greater part of the shore, in 1876. The principal industries are the coasting trade and fisheries.

DOUGLAS, GAWAIN or GAVIN (a. 1474–1522), bishop of Dunkeld, and the ancient classical poet of Scotland, was the third son of Archibald, earl of Angus, known in Scottish history as “Bell-the-Cat.” His mother was Elizabeth, daughter of Robert Lord Boyd, high chamberlain of Scotland. The year when he was born has not been recorded, but it is almost certain that it was 1474, or the beginning of 1475; and of his father’s seat the one most likely to have been his birthplace was Douglas Castle, Lannarkshire.

1 Being intended for the church, Douglas studied at the university of St Andrews, where his name appears in the lists of alumni between 1493 and 1494. In 1504, on his vowing to holy orders, he was shortly afterwards appointed rector of Haust, or Prestonkir, and parson of Linton in East Lothian. In 1501 he was elected dean or provost of the collegiate church of St Giles’s, Edinburgh, an office of dignity and emolument.

2 In the battle of Flodden (1513), when James IV., and many of the Scottish nobility and ecclesiastics were killed, the earl of Angus lost his two eldest sons, which so affected him that he retired to St Mains, a religious house in Galloway, where he soon after died. He was succeeded by his grandson, Archibald, a handsome young nobleman, who attracted the attention of the wadredow Queen Margaret, sister of Henry VIII. of England, and they were married within eleven months after the death of the king. While this precipitate connection incensed the nobility and caused much jealousy of the Douglas family, it seemed to open up a way for the preferment of Gavin Douglas. By the influence of the queen, Douglas was "postulated" by the Pope to the abbacy of Aberbrothock, or Arbroath. He met with such opposition, however, from a rival claimant, that his appointment was never completed, and he was unable to obtain his abbacy. Douglas was next recommended by the queen to the Pope for the archiepiscopate of St Andrews, then vacant; and, relying upon the validity of this appointment, he attempted by force to obtain possession of the castle of St Andrews. He was, however, unsuccessful, and ultimately was passed over in favour of Andrew Forman. At length, by the united influence of the queen and the Pope, he was nominated for the bishopric of Dunkeld, which shortly afterwards became vacant. The people were so indignant at the marriage of the queen with Angus that the Parliament deprived her of the regency of the kingdom and the charge of the young King James V., and appointed the duke of Albany to be regent in her room. One of the first acts of the duke, who came from France to assume the reins of government, was to bring Douglas to trial for intriguing for ecclesiastical benefices with the queen and the pope without the

3 Brechin has been stated as the birth-place of Douglas by Mr D. Black in his history of that town (2d ed. p 287), but no authority for this is quoted.

4 The authority for the former designation is Mylin’s Mils. Visit Episcop Dunkeld, by surrendring which Douglas is by Bishop Rake, and other reasons, rector of Rorn, and by Douglas and others, rector of Hawick. His latter designation is found in the MS. of his Traditions of Virgil, preserved in Trinity College, Cambridge.—Works. 1. p 173.
The marriage of the queen with the earl of Angus proved an unhappy one, and, in consequence of his ill-treatment of her, the queen separated from her husband and joined with the regent against the Douglases. Angus fled to the borders for a time, and in 1521 his uncle Gavin was deprived of his bishopric. The bishop then took shelter at the court of Henry VIII, but in 1522 he died of the plague at London, in the forty-eighth year of his age. His remains were interred in the Hospital Church of the Saviour.

The works of Bishop Douglas, though not numerous, are important. They consist of—(1) The Palace of Honour, a poem written in 1501,—an allegorical description of many gorgeous cavalcades of famous persons troop to a magnificent palace somewhat like Chaucer's Temple of Fame, in the execution of which Douglas has displayed much originality of treatment; (2) Another allegorical poem called The Heart, or the heart of man, descriptive of the progress of life from youth to age; (3) A short poem called Conscience, and (4) A Translation of the Enfer of Vergil, with the supplemental book of Mapheus Pegasus. To each book a short prologue is prefixed, of which the one before the 12th, "Where splendid Douglas paints the blooming May," is perhaps the finest effort of his muse.

This Translation of Vergil, by which Douglas is best known, is a work of which Scotland will always be proud, as it was the first metrical translation of a classical author made in Britain, and the precursor of many others. Although it is very diffuse, from the difficulty its author had in adapting the Doric language of his country to the purpose of translation, by the same reason it is a work of considerable philological value in tracing the history of the literary language of Scotland. Although Douglas was the first native writer who applied the name "Scottus" to the language he employed, he has Scottized many Latin words, and imported many expressions from the French; while his admiration of Chaucer has induced him to swell himself of some of the grammatical forms used by that poet. Still, his translation, written in the broad and widely spread dialect common at an early period to the north of England and Scotland, will always form one of the most important landmarks in Scottish philology. In concluding it Douglas unfortunately took farewell of poetic composition, and entered the arena of political strife, as the following extract shows.—

"Thy pen and instruments full yore
On Vergille post I fix for evermore
Near from thine synk matters to discourse.
My muse shall now be close contemplation
And silent as doth the byrd in cage
On whom thy yoke and servitude is long.
And of my days near pass the half date
That nature sith me granteth, wele I wate;
Thus, an I feild doun awayed the ballance,
Here I recenge yowkens observance,
And wyl dowe my labours evermore
And yow offering, I doo adone Godis worst.

Several early MSS of Douglas's Translation of Vergil exist. One is preserved in the library of Trinity College, Cambridge, copied by his amanuensis, Matthew Geddes, from the bishop's own copy of the first edition, which is in the library of the same college. There are also copies in the library of the University of Edinburgh, and one in that of the Marquis of Bath at Longleat. Of the printed editions one was issued by William Copland at London in 1553, one was printed by Robert Smollett in 1711, and one was presented to the members of the Bannatyne Club in 1559. The Palace of Honour was first printed at London by William Copland, without date, but probably in 1552, and an edition, printed by "Johnes Ros for Ilunse Charters," appeared at Edinburgh in 1579, of which only two copies are known to exist. This edition was reprinted for the Bannatyne Club. The works of Bishop Douglas were first collected and published at Edinburgh in 1874, under the editorship of Mr John Snell, with a life prefixed, and a glossary appended.

DOUGLAS, Stephen Arnold (1813–1861), an American statesman, was born at Brandon, in the State of Vermont, on the 25th April 1813. His father, a physician, died when he was still an infant, and in his youth he had to struggle with poverty. He was apprenticed to a cabinetmaker, but his health failed, and he quitted the employment after a year and a half. He next studied for three years at the academy of Camandaqua, giving special attention in the latter part of his course to law. In 1833 he went to seek his fortune, and settled in Jacksonville, Illinois. Here he supported himself for a few months by acting as an auctioneer's clerk and keeping a school. Called to the bar in March 1834, he quickly obtained a large and lucrative practice, and so early as the following year was elected attorney-general of the State. In December 1835 he was elected a member of the legislature, in 1837 he was appointed registrar of the land office at Springfield, and in December 1840 he became secretary of state of Illinois. He was a judge of the supreme court of Illinois from 1841 till November 1843, when he resigned the office in order to stand a candidate for Congress in the Democratic interest. In 1837 he had failed to secure his return by a majority of 30,000, on this occasion he was successful, being elected by a majority of 400. He took an active share in the Oregon controversy, assailing its principle determination not to yield one inch of the Territory to Great Britain, and advocating its occupation by a military force. He was also a leading promoter of the measures which resulted in the annexation of Texas and the Mexican war. Being chairman of the Territorial committee at first in Congress and then in the Senate, to which he was elected in March 1847, it fell to him to introduce the bills for admitting Iowa, Wisconsin, Minnesota, California, and Oregon into the Union, and for organizing the Territories of Minnesota, Oregon, New Mexico, Utah, Washington, Kansas, and Nebraska. On the recently disputed question of the permission of slavery in the Territories, Douglas advocated, if he was not the first to promulgate, what came to be known as the "popular sovereignty doctrine," by which each territory was to be left to decide the matter for itself in the same manner as a State. The bill for organizing the Territories of Kansas and Nebraska, which Douglas reported in January 1854, caused great popular excitement, as it repealed the Missouri compromise, and declared the people of "any State or Territory" free to form and regulate their domestic institutions in their own way, subject only to the constitution of the United States. There was great indignation throughout the free states, and Douglas, as the chief promoter of the measure, was hanged or burned in effigy in many places. In 1852, and again in 1856, he was a candidate for the presidency in the National Democratic Convention, and though on both occasions he was unsuccessful, he received strong support. In 1857 he distinguished himself by his vigorous opposition to the admission of Kansas into the Union under the Lecompton constitution, which he maintained to be fraudulent. In the following year he was engaged in a close and very exciting contest for the senatorship of Abraham Lincoln, who was the Republican candidate.
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DOUR, a town of Belgium, in the province of Hainaut, by D. Douglas in the department of Manche, whose asserted discoveries in Africa have in large measure been relegated to the region of romance. At an early period his imagination seems to have been fired by narratives of travel and adventure, and accordingly, when he fell heir to a wealthy relation, he at once proceeded to gratify his desire for personal acquaintance with foreign lands. He certainly wandered far and wide; and, according to his own profession, he visited India, Kashmir, Khurasan, Persia, Asia Minor, and many parts of Europe. After spending some time in Paris, and being admitted a member of the Société de Géographie, he proceeded in 1826 to Brazil, with the intention apparently of carrying on scientific explorations: from this purpose, however, he was diverted by the political circumstances of the country; and to replenish his funds he started business at Montevideo in partnership with a M. Laboissière. Towards the close of the following year, probably in October, after a short residence at Rio Janeiro, he left Brazil for the Portuguese possessions on the west coast of Africa, where his presence in March 1828 is proved by the mention made of him in certain letters of Castillio Branco, the governor-general of Loanda. In May 1831 he reappeared in Brazil. Claiming to have pushed his explorations into the very heart of Africa, as far as the 27th degree of longitude E. of Greenwich, or, in other words, into what is now known as the great equatorial lake region. His story was readily accepted by the Société de Géographie at Paris, which hastened to recognize his services by assigning him the great gold medal, and appointing him their secretary for the year 1832. On the publication of his narrative:

—Voyage au Congo et dans l'intérieur de l'Afrique équatoriale— which occupied four large volumes, and was accompanied by an elaborate atlas, the public enthusiasm might well run high. In company with his wife (a sister of his old Montevidean partner), and attended by about 400 native porters, the happy traveller had advanced from kingdom to kingdom rather like a monarch making a progress through his tributary states, distributing largesses and receiving homage, than like a humble adventurer defraying his expenses from his private purse. Everything went smooth for a time; the interior of Africa was described in text books and depicted in maps according to the discoveries of Douville; but in the August number of the Foreign Quarterly Review for 1832 the most sweeping charges of ignorance and fraud were launched against the author, and this attack was followed up in the Jouve des deux Mondes for November, by Thomas Lecardaire, who asserted that, during part of the time which he claimed to have spent in Africa, Douville had been a familiar object in the streets of Rio Janeiro. The tide of popular favour turned; and, in spite of the explanations furnished by Douville in Ma défense, 1852, and Trente mois de ma vie, ou quanse nous avons et quanse nous avons après mon voyage au Congo, 1833, the general decision was openly against him. Mlle. Aurdrun, a lady to whom he was about to be married, committed suicide from grief at the disgrace; and, after vainly attempting to obtain satisfaction from Lecardaire by duel, the poor adventurer himself withdrew in 1833 to Brazil, and proceeded to make explorations in the valley of the Amazon. According to Dr Gardner, in his Travels in the Interior of Brazil, he was murdered in 1837 on the banks of the São Francisco for charging too high for his medical assistance. His Brazilian manuscripts fell into the hands of M. S. Rang, by whom they were transmitted to M. Ferdinand Denys. While modern exploration has nothing to support the wider pretensions of Douville, no less an authority than Captain Burton asserts that his descriptions of the country of the Congo are life-like and
picturesque; that his observations on the anthropology, ceremonies, customs, and maladies of the people are remarkably accurate; and that even the native words inscribed into the text of his narrative “are for the most part given with unusual correctness.”

DOUG, or Dow, Gerhard (1613–1680), a celebrated Flemish painter, was born at Leyden on the 7th April 1613. His first instructor in drawing and design was Bartholomew Bolendo, an engraver, and he afterwards learned the art of glass-painting under Peter Krouwelonk. At the age of fifteen he became a pupil of Rembrandt, with whom he continued for three years. From the great master of the Flemish school he acquired his skill in colouring, and in the more subtle effects of chiaroscuro, and the style of Rembrandt is reflected in several of his earlier pictures, notably in a portrait of himself at the age of twenty-two, in the Bridgewater Gallery, and in the Blind Tobit going to meet his Son, at Wardour Castle. At a comparatively early point in his career, however, he had formed a manner of his own distinct from, and indeed in some respects antagonistic to, that of his master. Gifts of an unusual clearness of vision and precision of manipulation, he cultivated a minute and elaborate style of treatment, and probably few painters ever spent more time and pains on all the details of their pictures down to the most trivial Hire; but he also have spentfive a large, and his work was so fine that he found it necessary to manufacture his own brushes. Notwithstanding the minuteness of his touch, however, the general effect was harmonious and free from stiffness, and his colour was always admirably fresh and transparent. He was fond of representing subjects in lantern or candle light, the effect of which he reproduced with a fidelity and skill which no other master has equalled. He frequently painted by the aid of a concave mirror, and to obtain exactness looked at his subject through a frame crossed with squares of silk thread. His practice as a portrait painter, which was at first considerable, gradually declined, attests being unwilling to give him the time that he deemed necessary. His pictures were always small in size, and represented chiefly subjects in still life. Upwards of two hundred are attributed to him, and specimens are to be found in most of the great public collections of Europe. His chief d'œuvre is generally considered to be the Woman sick of the Palsy, in the Louvre. The Evening School, in the Amsterdam Gallery, is the best example of the candle-light scenes in which he excelled. In the National Gallery favourable specimens are to be seen in the Poultière's Shop and Portrait of Himself. Doug's pictures brought high prices, and it is said that President Van Spring of the Hague paid him 1000 florins a year simply for the right of pre-emption. Dow died in 1650. His most celebrated pupil was Franciscus Michi.

DOVE (Dutch, Duif; Danish, Dve; Icelandic, Dyfa, German, Taube), a name which seems to be most commonly applied to the smaller members of the group of birds by ornithologists usually called Pigeons (Columba), but no sharp distinction can be drawn between Pigeons and Doves, and in general literature the two words are used almost indiscriminately, while no one species can be pointed out to which the word Dove, taken alone, seems to be absolutely proper. The largest of the group to which the name is applicable is perhaps the Ring-Dove, or Wood-Pigeon, also called in many parts of Britain Coot and Queest (Columba palumbus, Linnaeus), a very common bird by throughout these islands and most parts of Europe. It associates in winter in large flocks, the numbers of which (owing partly to the destruction of predatory animals, but still more to the modern system of agriculture, and the growth of plantations in many districts where before were none) have of late years increased enormously, so that their depredations are very serious. In former days, when the breadth of land in British under green crops was comparatively small, these birds found little food in the dead season, and this scarcity was a natural check on their multiplication: even the extended cultivation of turnips and plants of similar use the case is altered, and perhaps at no time of the year has proved more plentiful than in winter. The Ring-Dove may be easily distinguished from other European species by its larger size, and especially by the white spot on either side of its neck, forming a nearly continuous "ring," whence the bird takes its name, and the large white patches in its wings, which are very conspicuous in flight. It breeds several times in the year, making for its nest a slight platform of sticks on the horizontal bough of a tree, and laying therein two eggs—which, as in all the Columbidae, are white.

The Stock-Dove (C. anatina, Temminck) much resembles the Stock-Dove, but is of a lighter colour, with two black bars on its wings, and a white band forming a tuft on each side of its tail. In its wild state it haunts most of the rocky parts of the coast of Europe, from the Faroe to the Cyclades, and, seldom going inland, is comparatively rare. Yet, as it is without contradiction the parent-stock of all our domestic Pigeons, its numbers must far exceed those of both the former put together. In Egypt and various parts of Asia it is represented by what Mr Darwin has called "Wild Rences," which are commonly accounted good "species" (C. cincta, C. examines, C. intermedia, C. leucotos, and so forth), though they differ from one another far less than do nearly all the domestic forms, of which more than 150 kinds that "breed true," and have been separately named, are known to exist. Very many of these, if found wild, would have unquestionably been ranked by the best ornithologists as distinct "species," and several of them would undoubtedly have been placed in different genera. These various breeds are classified by Mr Darwin in four groups as follows:—

**Group I.** composed of a single Race, that of the "Pouters," having the gullet of great size, barely separated from the crop, and often inflated, the body and legs elongated, and a moderate bill. The most strongly marked example, the Imperial English Pouter, is considered to be the most distinct of all domesticated pigeons.

**Group II.** includes three Races—(1) "Carriers," with a long pointed bill, the eyes surrounded by much loose skin, and the neck and body much elongated, (2) "Runters," with a long, massive bill, and the body of great size, and (3) "Turbits," with a short, broad bill, much bare skin round the eyes, and the skin over the nostrils swollen. Of the first four and of the second five subraces are distinguished.

**Group III.** is confessedly artificial, and to it are assigned five Races—(1) "Fan-tails," remarkable for the extraordinary development of their tails, which may consist of as many as forty-two rectrices in place of the ordinary twelve, (2) "Turbits" and "Owls," with the feathers of the throat diverging, and a short thick bill, (3) "Tumbler," possessing the marvellous habit of tumbling backwards during flight, or, when on the ground, from having a short, concave bill, (4) "Full-backs," in which the feathers are reversed, and (5) "Jacobins," with the feathers of the neck forming a hood, and the wings and tail long.

**Group IV.** greatly resembles the normal form, and comprises two Races—(1) Transmitters, with a tuft of feathers at the base of the neck curling forward, the face much feathered, and a very peculiar voice, and (2) Pigeons scarcely differing in structure from the wild stock.

Besides these some three or four other little-known breeds exist, and the whole number of breeds and sub-breeds 1.

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almost defies computation. The difference between them is in many cases far from being superficial, for Mr Darwin has shown that there is scarcely any part of the skeleton which is constant, and the modifications that have been effected in the proportions of the head and orbital apparatus are very remarkable. Yet the proof that all these different birds have descended from one common stock is nearly certain. Here there is no need to point out its bearing upon the "Theory of Natural Selection" which that eminent naturalist and Mr Wallace have rendered so well known. The antiquity of some of these breeds is not the least interesting part of the subject, nor is the use to which one at least of them has long been applied. The Dove from the earliest period in history has been associated with the idea of a messenger (Genesis viii. 8-12), and its employment in that capacity, developed successively by Greeks, Romans, Muslims, and Christians, has never been more fully made available than in our own day, as witness the "Pigeon-post" established during the recent siege of Paris.

Leaving, then, this interesting subject, space does not permit our here dwelling on various foreign species, which, if not truly belonging to the genus Columba, are barely separable therefrom. Of these examples may be found in the Indian, Ethiopian, and Neotropical Regions. Still less can we here enter upon the innumerable other forms, though they may be entitled to the name of "Dove," which are to be found in almost every part of the world, and nowhere more abundantly than in the American Region. Mr Wallace (Ibis, 1865, pp. 365-400) considers that they attain their maximum development in the Papuan Subregion, where, though the land-area is less than one-sixth that of Europe, more than a quarter of all the species (some 300 in number) known to exist are found—owing, he suggests, to the absence of forest-haunting and fruit-eating Mammals.

It would, however, be impossible to conclude this article without noticing a small group of birds to which in some minds the name Dove will seem especially applicable. This is the group containing the Turtle-Doves—the three-honoured emblem of tenderness and conjugal love. The common Turtle-Dove of Europe (Turtur auriatus) is one of those species which is gradually extending its area. In England, not much more than a century ago, it seems to have been chiefly, if not solely, known in the southern and western counties. Though in the character of a straggler only, it now reaches the extreme north of Scotland, and is perhaps nowhere more abundant than in many of the midland and eastern counties of England. On the continent the same thing has been observed, though indeed not so definitely; and this species has within the last twenty years or so appeared as a casual visitor within the Arctic Circle. The probable causes of its extension cannot here be discussed; and there is no need to dwell upon its graceful form and the delicate harmony of its modest colouring, for they are proverbial. The species is migratory, reaching Europe late in April and retiring in September. Another species, and one perhaps better known from being commonly kept in confinement, is that called by many the Collared or Barbary Dove (T. variegata)—the second English name probably indicating that it was by way of that country that it was brought to us, for it is not an African bird. This is distinguished by its cream-coloured plumage and black necklace. Some uncertainty exists to say about its original home, but it is found from Constantinople to India, and is abundant in the Holy Land, though there a third species (T. senegalensis) also occurs, which Canon Tristram thinks is the Turtle-Dove of Scripture. (A. E.)

DOVER (the ancient Dubris), principal county port of England, is situated close to the South Foreland, 72 miles from London, in a main valley of thechalk hills corresponding with the opposite cliffs between Calais and Boulogne. Its dominant object is the castle, on the east heights. Within its walls stands the Roman pharos; the Romano-British fortress church, remaining not only as a ruin, but (excepting roof) integrally in situ, forming a primitive Christian relic, unique in Christendom; some remains of the Saxon fort; and the massive keep and subsidiary defences of Norman building. These ancient works provide for a garrison of 750; but they are now covered by the superior fort of Burggeys, a position of great strength for 221 men. The western heights, where is still the foundation of a consort Roman church, form a circuit of elaborate fortifications, with provision for 2000 troops. Between these, and stretching inland, lies the town, of which the following are the principal features. 1. The harbour, once at the eastern, is now at the western extremity,—its three considerable basins being fit for mail steamers and ordinary trading vessels. 2. The admiralty wall is a massive structure of solid concrete and masonry extending about one-third of a mile into the sea, affording lee and landing accommodation for vessels of almost any burthen, made for ultimate connection by break-water with a horn east of the castle, so inclining the bay as a vast harbour. 3. The visiters' quarter consists of ranges of good houses along the length of the seaboard and elsewhere, notably a fine elevation newly built on a western spur of the Castle Hill. 4. Of old Dover, within its walls and gates, but little remains, except a remnant of the Saxon collegiate church of the canons of St Martin, and the parish church of St Mary the Virgin—rebuilt and enlarged in 1843-44, but preserving the three bays of the Anglo-Saxon church, with its western narthex, on which had been superimposed the Norman tower, still preserving its rich front to the street. 5. A later Norman church stands under the Castle Hill, which has been partially restored, but its parochial status trans-
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fered to the new parish church of St James. There are
the two other modern churches—Holy Trinity and Christ-
church, and, further up the valley, the parish church of
Charlton (originally Norman) and Backwell (Early En-
lish), which, including the Castle Church, completes the
former number of seven for the town. There are also 13 chapels
of nondenominational worship, representing most denomina-
tions, and placed in various parts of the borough. 6. The
remains of the once (12th century) splendid foundation
of St Martin’s Priory include the great gate, the house
rectory with campanile, and the spacious strangers’
rectory, lately converted into the college school-room.
7. Just across the High Street stand the tower and
truncated fabric of the noble hall of the hospital Mason
Dien, founded (13th century) for the reception of pilgrims
of all nations, long used as a Crown victualling office, but
latterly purchased by the corporation and adapted for a
town hall, with prison cells as basements, and other prison
buildings annexed, the former chapel of the society serving
now as a court of sessions. 8. The ground works of a round
(Holy Sepulchre) church of the Templars is on the opposite
heights, approaching the citadel. 9. Among the centres
of educational work are a proprietary college, occupying
the site and remaining buildings of St Martin’s Priory, for a
cheap but sound education of town boys, and for
boarders in the masters’ houses, and also a strong array of
national schools, worked up to a high mark, according
to HM. Inspectors’ reports, and providing means for a good
practical education of about 3400 children. In physical
conditions the place is exceptionally healthy, the registrars-
generals’ returns showing them in some years to be little
below those of the Malvern Hills. The steep shore and
open downs make it agreeable for bathing and summer
resort; and it has constant sea-going interest from the Con-
tinental mail service, and the course of vessels up and
down channel lying within two miles of the shore.
Objects of interest within easy reach are—the St Foredale
electric light-houses; the (ford Norman) church of St
Margaret’s; the Templars’ Manor, Ewell, St Radegund’s
Abbey, the Preceptory of Knights of St John, Swingfield;
rich Norman votive chapel, Barlrestone. There are two
lines of railway to London—one traversing the Wend of
Kent, the other following the old Roman road, via Canter-
bury and Rochester. Dover returns 2 members to Parlia-
ment, and is governed by a mayor, 6 aldermen, and 18
councillors. The area of the borough is 1296 acres.
Population (1871), 32,690.

DOVER, a city of the United States, capital of
Delaware, on Jones Creek, 9 miles inland from Delaware
Bay, and 48 miles south of Wilmington. It is a regular
brick-built place, with broad, well-shaded streets, being a
State house, a court-house, six churches, an academy, and
several other public buildings, and causes on a brisk trade
in preserved fruits. Population in 1870, 1003, of whom
301 were people of colour.

DOVER, George James Welldrove Agar Ellis, Baron
(1797–1833), born on the 14th January 1797, was the
east son of the second Viscount Childen. He was
educated at Christ Church, Oxford, and in 1818 he was
returned to Parliament as member for Heytesbury. He
afterwards represented Seaford (1820), Ludgrove (1826),
and Oakhampton (1830). In party politics he took little
interest; but he was a zealous and enlightened advocate
in Parliament and elsewhere of state encouragement being
given to the cause of literature and the fine arts. In 1824
he was the leading promoter of the grant of £37,000 for
the purchase of Mr Angerstein’s collection of paintings
which formed the foundation of the National Gallery.
On the formation of Lord Grey’s administration, in November
1830, he was appointed chief commissioner of woods and
forests. The post was one for which his tastes well fitted
him, but he was compelled by delicate health to resign it
after two months’ occupancy. In June 1831, during the
lifetime of his father, he was raised to the House of Lords
under the title of Baron Dover. His services to the cause
of learning and the fine arts, as well as his own distinction as
an author, led in 1833 to his election to the presidency of
the Royal Society of Literature. He died in the 10th
July 1833 Lord Dover’s literary works were chiefly his-
torical, and included The True History of the Iron Mask,
extracted from Documents in the French Archives (1826),
Historical Inquiries respecting the Character of Clarendon
(1827), and A Life of Frederick the Great (1831). He also
edited the Ellis Correspondence and Walpole’s Letters to Sir
Horace Mann. He left in manuscript a volume written
for the instruction of his son, which was published
posthumously under the title Lives of the Most Eminent
Sovereigns of Modern Europe. A fourth edition of this
work appeared in 1850.

DOW, Lorenzo (1777-1834), an American preacher,
noted for his eccentricities of dress and manner, was born
at Coventry, Connecticut, U.S., October 16, 1777. He
received but a limited education, and was much troubled
in his youth by religious perplexities; but he ultimately
joined the Methodists, and was appointed a preacher (1799).
The same year, however, his official connection with that
body ceased, and he came over to preach to the Catholics
of Ireland. He attracted great crowds to hear and see
him, and was often persecuted as well as admired. He
also visited England, introduced the system of camp meet-
ings, and thus led the way to the formation of the Primitive
Methodist Society. These visits were repeated in 1805
Dow’s enthusiasm sustained him through the incessant
labours of more than thirty years, during which he preached
in almost all parts of the United States. His later efforts
were chiefly directed against the Jesuits. His Pelagian
Works were published in 1814. Among his other writings
are The Stranger in Charleston, or the Trial and Confess-
of Lorenzo Dow (1822), A Short Account of a Long Trip
(1829), and the History of a Conaposta. He died
February 2, 1834.

DOWLETABAD, a city and fortress of India, in
the north-western corner of the Nizam’s Dominions, near one
of the right-hand tributaries of the Godavary. Though
still the centre of an administrative district, the city has sunk into comparative insignificance since the rise of Armagh, about ten miles to the east; but the fortress remains, from its natural position, one of the most remarkable in the country. It occupies the conical top of a great granite rock, which rises abruptly from the plain to a height of at least 300 feet, and is encompassed at the foot by a ditch upwards of 30 feet wide. The only means of access to the summit is afforded by a narrow bridge, with passage for not more than two men abreast, and a long gallery, excavated in the rock, which has for the most part a very gradual upward slope, but about midway is intercepted by a steep scram, the top of which is covered by a grazing destined to time of war to form the hearth of a huge fire kept burning by the garrison above. In spite, however, of its natural strength and its various artificial defences, the fortress has frequently been taken. When about the year 1293 the Mahometans invaded this part of the Deccan, Deogurh, as the city was then called, was the wealthy residence of a powerful rajah. In 1306 it was occupied by Mallek Nab, the emperor of Delhi's general; and in the early part of the same century Mahomet III, in his anxiety to make it the capital of his kingdom and worthy of its new name of Dowvetabad, or Aboe of Prosperity, endeavoured, but in vain, to cause a wholesale transmigration of the inhabitants of Delhi. About the year 1595 it surrendered to Ahmed Nisam, shah of Ahmadnagar; and on the fall of his dynasty it was taken possession of by Mallek Amber, an Abyssinian slave. His successors reigned till 1604, when it was taken by the Moguls, who transferred the seat of government to Aurungabad. In the 18th century it passed into the possession of Nizam el Malik.

DOWN, a maritime county of Ireland, in the province of Ulster, occupying the most easterly part of the island, is bounded N. by the county Antrim and Belfast Lough, E. and S. by the Irish sea, and W. by the county Armagh. Its area, including Ballymacarret, a suburb of Belfast (1670 acres), covers 967 square miles, or 612,409 acres. The coast-line is very irregular, and is indented by several loughs and bays. The largest of these is Strangford Lough, a fine sheet of water studded with 260 islets, 54 of which have names, and all of which are finely wooded or rich in pastureage. The lough runs for ten miles northwards, and the ancient castles and ruined abbeys on the islets render the scene one of singular interest and beauty. Further south Dundrum Bay forms a wider expanse of water. In the south-west Carlingford Lough separates the county from Louth. On its north-east shore lies the village of Rosstrevor, now the resort of invalids from all parts of the United Kingdom.

Mountains.—Between Strangford and Carlingford loughs the county is occupied by a range of hills known in its south-western portion as the Mourne Mountains, which give rise to the four principal rivers—the Bann, the Lagan, the Annacloy, and the Nevery. The highest peak in the Mourne range is named Slieve Donard. It is 2796 feet above the level of the sea, and is exceeded only by one peak, Lugdoo, in the Wicklow range, and the higher peaks in Killarney.

Springs.—Down is celebrated for its holy wells and mineral springs. The chalybeat are more numerous than the sulphurous, but both abound. There are springs at Ardmullan, Granshaw, Dundonnell, Magheralin, Dromore, Nevery, Banbridge, and Terkeely. The Struel springs, a mile south-east of the town of Downpatrick, are celebrated for their healing properties. Fifty years ago these were regarded as possessing not only chemical wealth in rare abundance, but miraculous powers; and the decline of public credulity in the latter was coincident with the failure of the wells. To this day, however, the wells, which are four in number, are visited, and certain religious observances maintained, sometimes for a week. Circuits on the knees are made round the wells; and amongst the ignorant the reputation of the sacred waters remains unimpaired.

The scenery of the county is pleasantly diversified, the people are intelligent and comparatively well educated, the landed proprietors are resident, and there is a thriving independence which may be looked for in vain outside the province of Ulster.

Minerals.—There are several quarries of fine sandstone. The best is that on Scrabo Hill, near Newtownards, where a very close-grained, clear-coloured, and hard and durable stone is raised. Limestone is not very general. Near Comber, on the shores of Strangford Lough, is a very hard and sparkling kind of reddish granular limestone. But the greatest magazine of this rock is in the vicinity of Moura, where the stone lies very near the surface. Granite occurs in many places in detached masses, but the great body of it is confined to the southern and western regions, chiefly in the Mourne Mountains. Crystals of topaz and beryl are found in the granite of Slieve Donard. Indications of lead have been discovered near Castlereagh, Killough, Newtownards, and Warrenpoint; and traces of copper in the Mourne Mountains near Rosstrevor.

Soil.—The predominating soil is a loam of little depth, in most places intermixed with considerable quantities of stones of various sizes, but differing materially in character according to the nature of the subsoil. Clay is mostly confined to the eastern coast, and to the northern parts of Castlereagh. Of sandy soil the quantity is small; it occurs chiefly near Dundrum. Moor grounds are mostly confined to the skirts of the mountains. Bogs, though frequent, are scarcely sufficient to furnish a supply of fuel to the population.

According to Owners of Land Return (1876), there were, in 1873, 3056 separate proprietors, owning a total area of 608,214 acres, valued at £775,518. The number of owners of less than 1 acre numbered 1460, or 40 per cent, that of all Ulster being 48 per cent. The average size of the properties was 165½ acres, and the average value per acre was £21.5s.6d., as against 259½ acres and 16s.8½d. respectively for Ulster. As in the neighbouring counties of Antrim and Armagh, the value of the land in Down is considerably higher than that of the rest of the province. Eighteen proprietors owned upwards of 6000 acres each, and among them an aggregate extent equal to 46½ per cent. of the total area,—the principal holders being—Marquis of Downshire (Hillsborough), 64,356 acres; the Kilmerley Trustees, 37,454; Earl of Annesley (Castlewellan), 23,567; Marquis of Londonderry (Newtownards), 23,554; Colonel W. B. Forde (Seaford), 19,882; Earl Dufferin (Clondeboy), 18,328; Hon. R. Meade's trustees (Dromore), 13,492; R. N. Batt (Belfast), 12,010; and Lord A. E. Hill-Trevor, 10,940.

Agriculture.—Of the total area of the county, which is 610,740 acres (exclusive of Ballymacarret), there are 333,541 acres under tillage, 187,604 in pasture, and 12,027 under wood. Although comparisons as to yields of crops between different periods is now fallacious, inasmuch as the increased and increasing importation of wheat into Ireland has altered the system of agriculture, it may be mentioned that, while in five years the cultivation of wheat has fallen from 244,451 acres to 119,597 in Ireland, during the same period in Down the decrease was from 32,734 acres to 21,272. There are many landed proprietors who hold large tracts in their own hands. The great bulk of the proprietor ship is orderly and industrious. Their dwellings are better constructed and furnished than those for a similar class in other parts of Ireland. The pro-
ceases of agriculture, owing in a great degree to the example set by the resident gentry, are skilfully carried on. The land is well cultivated. The farms are in some districts small, and the effect of emigration has been to consolidate the holdings.

The breed of horses is an object of much attention, and some of the best racers in Ireland have been bred in this county. The native breed of sheep, a small hardy race, is common to the mountains. The various other kinds of sheep have been much improved by judicious crosses from the best breeds. Hogs are reared in great numbers, chiefly for the Belfast market, where the large exportation occasions a constant demand for them, and those of very superior quality being prepared in that town.

The following figures give the average of the principal crops and the numbers of live stock raised in the years 1873 and 1876 respectively:

<table>
<thead>
<tr>
<th>Year</th>
<th>Wheat</th>
<th>Oats</th>
<th>Potatoes</th>
<th>Turnips</th>
<th>Flax</th>
<th>Horses</th>
<th>Cattle</th>
<th>Sheep</th>
</tr>
</thead>
<tbody>
<tr>
<td>1873</td>
<td>24,783</td>
<td>118,342</td>
<td>53,286</td>
<td>21,137</td>
<td>27,058</td>
<td>114,557</td>
<td>52,273</td>
<td>20,875</td>
</tr>
<tr>
<td>1876</td>
<td>25,372</td>
<td>119,537</td>
<td>62,673</td>
<td>20,875</td>
<td>53,619</td>
<td>115,272</td>
<td>51,272</td>
<td>11,227</td>
</tr>
</tbody>
</table>

Along with Tyrone, the county grows the largest extent of flax in Ireland, and the largest extent of the oil-seed flax. The county is divided into the boroughs of Downpatrick, Hillsborough, Newry, and Newtownards; and the large stock Down possesses, a greater number of horses than any other Irish county with the exception of Cork.

Fisheries—These are not developed as they might be. The Kilkeel herring fishery realized £1203 in 1871, £2000 in 1872, £13,249 in 1873, £2000 in 1874, and £15,060 in 1875. There are fishing stations at Donaghadee, Strangford, Newcastle, and Carlingford; the total number of vessels in 1875 was 678, and of men and boys 2537.

In 1850 there were 1468 vessels and 4640 hands.

Administration—The county is divided into 14 baronies, 70 parishes, and 123 townlands. It forms part of the united dioceses of Down, Connor, and Dromore; and it belongs to the military district of Belfast. The assizes are held at Downpatrick; quarter sessions at Banbridge, Downpatrick, Hillsborough, Newry, and Newtownards; and there are 26 petty sessions districts.

The poor-law unions of Downpatrick, Kilkeel, and Newtownards are wholly within the county, and those of Banbridge and Newry partly in Down and partly in Armagh. The total sum expended in poor-law administration in 1875 was £21,076, and the average daily number of paupers 1280.

The county prison and infirmary are in Downpatrick, but the county lunatic asylum is in Belfast. Down returns 14 members to Parliament—2 for the county at large, 1 for Downpatrick, and 1 for Newry. Portions of the boroughs of Belfast and Lisburn are in Down county, but they are regarded more properly as parts of Antrim and Armagh respectively.

Previous to the Act of Union Down returned 14 members to the Irish Parliament—2 for the county at large, and 2 each for the boroughs of Banbridge, Downpatrick, Hillsborough, Newry, Newtownards, and Kilkeel.

Population.—The general decrease of population in the province of Ulster between the census of 1851 and that of 1871 indicates a percentage of 8%, while that of this county amounts to 13%. This decrease may be ascribed in some part to the migration of the people to Belfast and the neighbouring manufacturing towns, as well as to the emigration to foreign countries. In 1851, the inhabitants of Down (exclusive of the part of Belfast) numbered 320,617; in 1861, 320,302; in 1871, 277,294, of whom 130,457 were males and 146,837 females.

At the last census it appeared that 31% per cent. belonged to the Roman Catholic persuasion, the numbers being—Catholics, 88,003; Episcopalian, 60,865; Presbyterian, 116,017; and others, 15,406. There were at the same time 140,866 persons of five years and upwards who could read and write, 57,140 who could read but could not write, and 45,792 who were illiterates. There were 20 superior schools in the county, and 527 primary schools.

The following are the principal towns—Newtownards, population 5552, Banbridge, 5600, Downpatrick, 4155; Holywood, 3573, Gilford, 2729; Bangor, 2560; Dromore, 2108; Donaghadee, 2226; Comber, 2056; Portaferry 1938; Rathfriland, 1827; Warrenpoint, 1806; Killyleagh, 1772; Kilkeel, 1335; and Ballymaloe, 1229.

Newry, partly in Down and partly in Armagh county, has a population of 14,213.

History and Antiquities—From the period of the English settlement to the Irish revolt in 1633, Down formed two counties, Newtownards in the north and Down in the south. The English settlers at that time were driven into the maritime baronies of Ards, Leigh, and Moone, of which they in part retained possession. The remainder of the district fell into the hands of Irish families, the O'Neills of Clancboy, the MacArtans, MacMorris, and MacGinnesses, whose possessions, however, reverted to the crown on the attainder of Shane O'Neal, in the latter half of the 16th century; but having afterwards submitted to the Government, they retained their former estates. In 1660 the O'Neal estates were again restored, and granted to Sir Hugh Montgomery and Mr Hamilton, who planted Scotch colonists on the land. The estates of the remaining old Irish, and Anglo-Norman families were mostly forfeited in the rebellion of 1641, or subsequently at the Revolution.

The county is not noted for its interesting ruins. At Strabane, near the borders of Antrim, there is a group of ten or twelve pillar stones in a circle, about 10 feet in height. A very curious cairn on the summit of Slieve Croob is 80 yards in circumference at the base and 80 at the top, where is a platform on which carns of various heights are found standing. The village of Anadorn is famous for a cairn covering a cave which contains ashes and human bones. Cromlechs, or altars, are numerous, the most remarkable being the Giant's Ring, which stands on the summit of a hill near the borders of Antrim. This altar is formed of an unwrought stone 7 feet long by 61 broad, resting in an inclined position on rude pillars about 3 feet high. This solitary landmark is in the centre of an inclosure about 3 miles in circumference, formed of a rampart about 20 feet high, and broad enough atop to permit two persons to ride abreast. Near Downpatrick is a road, or mound of earth, three-quarters of a mile in circumference, its exterior consisting of three artificial ramparts, the largest of which is 30 feet broad. In its vicinity are the ruins of Saul Abbey, said to have been founded by St Patrick, and Inch Abbey, founded by Sir John de Courcy in 1180. The number of monastic ruins is also considerable. The most ancient and celebrated is the abbey or cathedral of Downpatrick, supposed to have been founded by St Patrick soon after his arrival here in 432, and said to contain his remains, together with those of St Columba and St Bridget. It was restored in 1790, when the adjoining round tower was taken down.

DOWNPATRICK, a municipal and parliamentary borough and market-town of Ireland, capital of the county of Down, 18 miles S.E. of Belfast, and 74 N.W. of Dublin. Downpatrick lies in a valley formed by hills of some elevation, near the south-west extremity of Strangford Lough, and is divided into the English, Irish, and Welsh quarters. It consists of four main streets meeting near the centre, the principal of which are the Irish and English streets. In the former all business is carried on; the latter is well built, and contains many private residences.
DOXOLOGY, a hymn in praise of the Almighty. The name is often applied to the Trisagion, or "Holy, Holy, Holy," the scriptural basis of which is found in Isaiah vi. 3; to the Hallelujah of several of the Psalms and of Rev. xix.; and to the last clause of the Lord's Prayer according to Saint Matthew, which critics are generally agreed in regarding as an interpolation. It is used, however, more definitely as the designation of two hymns distinguished by liturgical writers as the Greater and Lesser Doxologies. The origin and history of these is impossible to trace fully. The germ of both is to be found in the Gospels; the first words of the Greater Doxology, or Gloria in Excelsis, being taken from Luke x. 14, and the form of the Lesser Doxology, or Gloria Patri, having been in all probability first suggested by Matt. xxviii. 19. The Greater Doxology, in a form approximating to that of the English prayer-book, is given in the Apostolical Constitutions (vii. 47). That is the earliest record of it, unless, indeed, the Apocryphal Constitutions be taken to be of a later date than the Alexandrine Codex, where the hymn also occurs. Alcuin attributes the authorship of the Latin form—the Gloria in Excelsis—to St Hilary of Poitiers (died 365), but this is at best only a plausible conjecture. The quotations from the hymn in the De Virginitate of Athanasius, and in Chrysostom (Hom. 69 in Matt.), include only the opening words (those from St Luke's gospel), though the passage in Athanasius shows by an interpolation that only the commencement of the hymn is given. These references indicate that the hymn was used in private devotions; as it does not appear in any of the earliest liturgies, whether Eastern or Western, its introduction into the public services of the church was probably of a later date than has often been supposed. Its first introduction into the Roman liturgy is due to Pope Symmachus (496–514), who ordered it to be sung on Sundays and festival days. The Mozarabic liturgy provides for its eucharistic use on Sundays and festivals. In these and other early liturgies the Greater Doxology occurs immediately after the commencement of the service; in the English prayer-book it is introduced at the close of the communion office, but it does not occur in either the morning or evening service. The Lesser Doxology, or Gloria Patri, combines the character of a creed with that of a hymn. In its earliest form it ran simply—"Glory be to the Father, and to the Son, and to the Holy Ghost, world without end, Amen," or "Glory be to the Father, and to the Son, and by the Holy Ghost." Of the Arrian heresy these forms were probably regarded as indifferent, both being equally capable of an orthodox interpretation. When the Arians, however, finding the second form more consistent with their views, adopted it consistently and exclusively, its use was naturally discon- tenanced by the Catholics, and the other form became the symbol of orthodoxy. To the influence of the Arian heresy this also obviously due the addition of the clause—"as it was in the beginning, is now, and ever shall be," the use of which was, according to some authorities, expressly enjoined by the Council of Nicæa. There is no sufficient evidence of this, but there exists a decree of the second Council of Vaison (529), asserting its use as already established in the East propter hæreticorum statutum, and ordering its adoption throughout the churches of the West. In the Western Church the Gloria Patri is repeated at the close of every psalm, in the Eastern church at the close of the last psalm.

DOYEN, GABRIEL FRANÇOIS (1726–1806), an eminent French painter, was born at Paris in 1726. His passion for art prevailed over his early education, and at the age of twelve years and seven months he became a pupil of Vanloo. Making rapid progress, he obtained at twenty the grand prize, and in 1748 set out for Rome. He studied the works of Annibale Carracci, Cortona, Giro Romano, and Michelangelo, then visited Naples, Venice, Bologna, and other Italian cities; and in 1755 returned to Paris. At first unprecitated and disregarded, he resolved by one grand effort to conquer a reputation, and in 1758 he exhibited his Death of Virginia. It was completely successful, and procured him admission to the Academy. Among his greatest works are reckoned—the Miracle des Ardenes, painted for the church of St Genève at St Roch (1773); the Triumph of Thetis, for the chapel of the Invalides; and the Death of St Louis, for the chapel of the Military School. In 1776 he was appointed professor at the Academy of Painting. Soon after the beginning of the Revolution he accepted the invitation of Catherine II. and settled at St Petersburg, where he was loaded with honours and rewards. He died there June 5, 1806.

DRAÇO, a celebrated Athenian legislator who flourished in the 7th century B.C. By a strange irony of fate his name has passed into a proverb for an inexorable lawgiver, whose laws were written with blood and not with ink. Modern Greek historians, such as Thirlwall, Grote, and Curius, have clearly shown that such a character is an utter perversion of fact. Of Draco's famous code not a single line remains, and all we know of it is derived from a few scattered notices occurring mostly in late Greek authors. Of these the most important is a passage in Plutarch's life of Solon. After stating that Solon abolished the whole of Draco's legislation, except in cases of murder, on account of its harshness and severity, Plutarch adds by way of commentary—"For nearly all crimes there was the same penalty of death. The man who was convicted of idleness, or who stole a cabbage or an apple, was liable to death no less than the robber of temples or the murderer." To the same effect is a traditional saying of Draco by which he justified the rigour of his laws. The least offence, he said, seemed to him deserving of death, and he could devise no greater for the worst crime. It is obvious that the statement of Plutarch is not meant to be accepted as a literal statement of fact, and it is probable that to the most bloodthirsty of Draco's laws parallels might be quoted from English statutes against vagrancy and theft. All that Draco did was to put into writing the customary laws of his time and nation. It was natural that these laws, the growth of a rude and primitive age, should strike writers of the Augustan age as indiscriminative and inhuman, and that he made no change in the constitution of Athens we have the express testimony of Aristotle. The judicial changes which he effected, so far from aggravating, 11
tended to mitigate the severity of early Athenian law. Before his time all cases of homicide were tried by the Areopagus and we are justified in inferring that death was the universal penalty. To Draco is generally attributed the establishment of the ἱέραμα, a body of fifty-one elders, who sat in four different courts,—one for cases of accidental homicide, a second for justifiable homicide, a third for cases where another homicide had been committed abroad by a prisoner who had been banished by one of the above-named courts, and a fourth for cases of desolad. Such an institution as itself enough to explode the traditional conception of Draco, and we may now proceed to discuss the true character of his legislation. At Athens, as at Rome, the kings were the depositaries and administrators of law. With the extinction of the regal power this prerogative passed into the hands of the aristocracy as represented by the archons. It was in the nature of things that such a monopoly should be abused. The remedy for this abuse which the commons sought was a published code of laws. It was attained at Rome by the law of the Twelve Tables, and at Athens by the code of Draco, 621 B.C. In both of these orders, which he termed "cases the promulgated law was merely an enunciation of the common law. The only value of the story which he told us was the work of Draco. Of his life we know absolutely nothing with the exception of a most improbable story related by Suidas. In Suidas's Lexicon, under the word "Draco," we are told that he composed his code in his old age, and was smothered to death in the theatre at ᾿Εργα with the caps, chitons, and cloaks which were thrown at him by an enthusiastic audience. The only value of the story is that it may show the feelings with which he was regarded by the commons of his own day.

DRAGON (קרבזא, sharp-sighted), the name given by the ancients to a fabulous monster represented by them as a huge winged lizard or serpent. They regarded it as the enemy of mankind, and its overthrow is made to figure among the greatest exploits of the gods and heroes of heathen mythology. A dragon watched the garden of the Hesperides, and its destruction formed one of the seven labours of Hercules. Its existence does not seem to have been called in question by the older naturalists, figures of the dragon appearing in the works of Gesner and Aldrovandi, and even specimens of the monster—evidently formed artificially of portions of various animals—having been exhibited. The only creatures ever known to have existed, at all comparable to this imaginary monster, are the Pterodactyli, remains of which are found in the Jurassic and Cretaceous formations. These were huge reptiles, provided with true wings somewhat resembling those of bats. The name "dragon" is now applied to a highly interesting, but very harmless, group of small flying lizards forming the genus Draco, belonging to the Agamidae, a family of Saurian Reptiles. They inhabit India and the islands of the Malay Archipelago, and 18 species of them are known. They are small creatures, measuring about 10 inches long, including the tail, which in some cases is more than half of the entire length. The head is small, and the throat is provided with three pouches which are spread out when they lie on the trunks of trees. They are, however, chiefly remarkable for the wing-like cutaneous processes with which their sides are provided, and which are extended and supported by greatly elongated ribs. These form a sort of parachute by which the animals are enabled to glide from branch to branch of the trees on which they reside, but, being altogether independent of the fore limbs, they cannot be regarded as true wings, nor do they enable the lizard to fly, but merely to make extensive leaps. When not in use they are folded by the side after the manner of a fan, and can be drawn out and altered with considerable agility. They also use their wing-like expansions in clasping the branches of trees, where they are fond of lying basking in the sun, and feeding on whatever insect may come in their way. When threatened with danger they are said to feign death.

DRAGON-FLY (German, Wasserjungfer; Swedish, Trollslända; Danah, Guledmed; Dutch, Scherpenkendelst, French, Demoiselle), the popular English name applied to the members of a remarkable group of insects which formed the genus Libellula of Linnaeus, the first mention of which seems to be in the works of Pliny. In some parts of the United States they appear to be known as "Devil's Darning Needles," and in many parts of England are termed "Horse-stungers." It is almost needless to say that (excepting to other insects upon which they prey) they are perfectly innocuous, though some of the larger species can inflict a momentarily painful bite with their powerful jaws. Their systematic position is at present contested and somewhat uncertain. By most of the older systematists they were placed as forming part of the heterogeneous order Neuroptera. Fabricius, however, elevated them to the rank of a distinct order, which he termed Odonata, and whatever may be the difference of opinion amongst authors at the present day, that term is almost universally employed for the group which he transferred all the groups of so-called Neuroptera with incomplete metamorphoses, hence including the dragon-flies, as a division of Orthoptera, a term which he termed Pseudonuroptera. Gerstacker more recently also retains them in the Orthoptera, terming those groups in which the earlier states are incomplete metamorphoses, hence. It is not necessary to enter into an examination here of the merits or demerits of those various systems, and it will suffice to say that all are agreed in maintaining the insects as forming a group marked by characters at once extraordinary and isolated in their nature.

The group Odonata (using the term as a matter of convenience) is divided into three families, and each of these again into two sub-families. The families are the Agri- ouada, Brachilura, and Libellulidae,—the first including the sub-families Calopterygina and Agrionina, the second Gomphina and Libellulina, and the third Cordulina and Libellulina.

The structure of a dragon-fly being so very remarkable, it is necessary to enter somewhat extensively into details. The head is comparatively small, and excavated posteriorly, connected very slightly with the prothorax, on which it turns almost as on a pivot. The eyes are a single, enormous, often contiguous and occupying nearly the whole of the upper surface of the head, but sometimes (Agriouada and Gomphina) widely distant; occupied by innumerable facets, which are often larger on the upper portion. In front of them is a portion termed the vertex, which sometimes (Libellulina) forms a slender, narrow, and nearly equal length of the head, but sometimes (Agriouada and Gomphina) divided almost to its base into two portions, or more frequently entire or nearly so; on each side of it are two usually enormous hypertrophied pieces, which form the "palpi," and which are often furnished with an articulated spine (or terminal joint), the whole structure serving to retain the prey. Considerable diversity of opinion exists...
with respect to the composition of the mouth parts, and by some authors the “palp” have been termed the side pieces of the lower lip. In a dead dragon-fly the parts are closed on each other, and, for a just appreciation of their structure and power, it is necessary to take a living example in the fingers by the thorax, slight lateral pressure on which causes the insect to display the formidable arrangement. The prothorax is extremely small, containing (with some authors the “triumvirate,” which is either open or traversed by nerves; but in many Agrionidae this space, instead of being triangular, is oblong or elongately quadrature, or with its upper edge partly straight and partly oblique. This feature of type in neurotisation is not one of the least important of the peculiarities exhibited in these insects.

The internal structure is comparatively simple. The salivary glands appear to be absent, and the whole digestive apparatus consists of an elongate canal extending from mouth to anus, comprising the esophagus, stomach, and intestine, with certain dilatations and constrictions; the characteristic Malugalian vessels are stated to number about forty, placed round the posterior extremity of the stomach. Dragon-flies eat their prey completely, and do not content themselves by merely sucking its juices; the harder portions are rejected as elongate, nearly dry, pellets of excrement.

But the most extraordinary feature in the economy, —one which has attracted the attention of naturalists from remote times,—is the position of the genital organs, and the corresponding anomalous manner in which the pairing of the sexes and impregnation is effected. In the male the intromittent organ is (as stated above) situated in a slit on the under surface of the second abdominal segment; it is usually very crooked or sinuous in form, and is accompanied by sheaths, and by external hooks or secondary appendages, and also by seminal vessels. But the ducts of the vessels connected with the testes unite and open on the under surface of the ninth segment; hence, before copulation can take place, it is necessary that the vessels in the second segment be charged from this opening, and in the majority of cases this is done by the male previously to seeking the female. In the latter sex the entrance to the oviduct and genital organs is on the under surface of the eighth segment of the male. The act of copulation may be briefly stated as follows. The male, when flying, seizes the prothorax of the female with the strong appendages at the extremity of the abdomen, and the abdomen of the latter sex is then curved upward so as to bring the under side of the eighth segment into contact with the organs of the second segment of the male. This act must have been observed by all, though few non-entomologists are acquainted with the reasons for this most extraordinary position. In the more powerful Libellulidae, &c., the act is of short duration, and it is probable that copulation and polyandry exist, for it possibly requires more than one almost momentary act to fertilise all the eggs in the ovaries of a female. But in many Agrionidae, and in some others, the male keeps his hold of the prothorax of the female for a lengthened period, retaining himself in flight in an almost perpendicular manner, and it may be that the deposition of eggs and pairing goes on alternately. There is, however, much yet to be learned on these points. The gravid female usually lays her eggs in masses (but perhaps sometimes singly), and the operation may be witnessed by any one in localities frequented by these insects. She hovers for a considerable time over nearly the same spot, rapidly dipping the apex of her abdomen into the water, or at any rate touching it often in places where there are no water-weeds, so that in all probability the eggs fall at once to the bottom. But in some of the Agrionidae the female has been often noticed...
AQUATIC DRAGON-FLY

by trustworthy observers to creep down the stems of aquatic plants several inches below the surface, emerging after the act of oviposition has been effected; and in the case of Leptes spenor, Von Siebold saw the male descend with the female. The same exact observer noticed also in this species that the female makes slight incisions in the stems or leaves of water plants with the double serrated apparatus (vulva) forming a prolongation of the ninth segment beneath, depositing an egg in each incision. He has seen two pairs thus occupied beneath the surface on one and the same stem.

FIG. 1 — The antenatal portion of the body of Leptes spenor freed from the puparium.

The duration of the sub-aquatic life of a dragon-fly is no doubt variable, according to the species. In the smaller forms it is probably less than a year, but precise evidence is wanting as to the occurrence of two broods in one year. On the other hand, it is certain that often a longer period it emerges from the egg to the time when it leaves the water to be transformed into the aerial perfect insect. The number of moults is uncertain, but they are without doubt numerous. At probably about the antepenultimate of these operations, the rudimentary wings begin to appear as thoracic budgins, and in the full-grown nymph these wings overlap about one-half of the dorsal surface of the abdomen. In structure there is a certain amount of resemblance to the perfect insect, but the body is always much slouther and shorter, in some cases most disproportionately so, and the eyes are always separated, even in those genera (e.g., Lestinae) in which the eyes of the imago are absolutely contiguous, the moat that can be seen in the larva is a prolongation towards each other, and there are no oceli. The legs are shorter and more fitted for crawling about water plants and on the bottom. In the mouth parts the mandibles and maxillae are similar in form to those of the adult, but there is an extraordinary and unique modification of the lower lip. This is attached to an elongate and slender mentum articulated to the posterior portion of the lower surface of the head, slightly widened at its extremity, to which is again articulated the labium proper, which is very large, flattened, and gradually dilated to its extremity; but its form differs according to group as in the perfect insect. Thus in the Aeshnominae it is deeply cleft, and with comparatively slender side-pieces (or palpi), and strongly developed articulated spines, in the Lestinae it is at the most notched, with narrow side-pieces and very strong spines; in the Libellulidae it is entire, often triangular at its apex, and with enormously developed palpi without spines, but having the opposing inner edges furnished with interlocking serrations. The whole of this apparatus is commonly termed the mask. In a state of repose it is applied closely against the face, the elongated mentum directed backward and lying between the anterior pair of legs; but when an approaching victim is seen the whole apparatus is suddenly projected, and the prey caught by the raptorial palpi, in some large species it is capable of being projected fully half an inch in front of the head. The prey, once caught and held by this apparatus, is devoured in the usual manner. There are two pairs of thoracic spiracles, but respiration is mostly affected by a peculiar apparatus at the tail end, and

FIG. 2.—The tail being extricated.

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FIG. 4.—The perfect insect (the wings having squared their full dimensions) resting to dry itself, preparatory to the wings being horizontally extended.

FIG. 3.—The whole body extricated.
there are two different methods. In the 

Agrionidae there are three elongate flattened plates, or false gills, full of tracheal ramifications, which extract the air from the water, and convey it to the internal tracheae (in Calopteryx these plates are excessively long, nearly equaling the abdomen), the plates also serving as means of locomotion. But in the other groups these external false gills are absent, and in their place are the valves, which by their sudden opening and closing force in the water to the rectum, the walls of which are furnished with branchial lamellae. The alternate opening and closing of these valves enables the creature to make quick jerks or rushes (incorrectly termed "leaps") through the water, and, in conjunction with its mouth parts, to make sudden attacks upon prey from a considerable distance. The lateral angles of the terminal abdominal segments are sometimes produced into long curved spines. The figures on last page indicate this process as observed in 

Agrion cyanum.

For a considerable time after its emergence a dragon-fly is without any of its characteristic colours, and is sciacid and weak, the wings (even in those groups in which they are afterwards horizontally extended) being held vertically in a line with the abdomen. By degrees the parts harden, and the insect essays its first flight, but even then the wings have little power and are semi-opaque in appearance, as if covered with a bluish bloom, whereas that of the abdomen, when the other end can be cut off, is brilliantly metallic blue, green, bronzy green, blue, or black, but the colours in the other groups vary much, and often differ in the sexes. Thus in Libellula depressa the abdomen of the fully adult male is covered with a bluish bloom, whereas that of the female is yellow; but several days elapse before this condition is attained, and a comparatively young male is yellow like the female. The wings are typically hyaline and colourless, but in many species (especially Calopteryx and Libellula) they may be wholly or in part opaque and often black, due apparently to gradual oxygenization of a pigment between the two membranes of which the wings are composed; the brilliant iridescent, or metallic lustre, so frequently found is no doubt due to interference—the effect of minute irregularities of the surface—and not produced by a pigment. A beautiful little genus (Chalcopteryx) of Calopteryx from the Amazon is a gem in the world of insects, the posterior wings being of the most brilliant fiery metallic colour, whereas the anterior remain hyaline.

These insects are pre-eminent lovers of the hottest sunshine (a few are somewhat crepuscular), and the most powerful and daring on the wing in fine weather become inert and comparatively lifeless when at rest in dull weather, allowing themselves to be captured by the fingers without making any effort to escape. Many of the larger species (Aeshna, Dr.) have a habit of affecting a particular twig or other resting place like a fly-catcher among birds, darting off after prey and making long excursions, but returning to the chosen spot. Mr Wallace, in his Malay Archipelago, states that the inhabitants of Lombok use the large species for food, and catch them by means of lined twigs.

They are distributed over the whole world excepting the polar regions, but are especially insects of the tropics. At the present day about 1700 species are known, dispersed unequally among the several sub-families as follows: Agrionina, 490 species; Calopterygina, 170; Gomphina, 210; Aeshnina, 150; Cordulina, 100; Libellulina, 850. In Europe proper only 100 species have been observed, and about 46 of these occur in the British islands. New Zealand is excessively poor, and can only number 8 species, whereas they are very numerous in Australia. Some species are often seen at sea, far from land, in calm weather, in troops which are no doubt migratory; our common Libellula quadruncula, which inhabits the cold and temperate regions of the northern hemisphere, has been frequently seen in immense migratory swarms. One species (Pantala flavescens) has about the widest range of any insect, occurring in the Old World from Kamchatka to Australia, and in the New from the Southern States to Chili, also all over Africa and the Pacific islands, but is not found in Europe. The largest species occur in Aeshnina and Agrionina, a member of the former sub-family from Borneo expands to nearly 65 inches, and with a moderately strong body and powerful form; in the latter the Central American and Brazilian Megaloprepus cernulatus and species of Mecistogaster are very large, the former expanding to nearly 7 inches, and the latter to nearly 8 inches, but the abdomen is not thicker than an ordinary grass-stem and of extreme length (fully 5 inches in Mecistogaster). Among living entomologists the dragon-flies have received, and are receiving, great attention, especially from the Baron de Selys-Longchamps of Liège, and from Dr H. A. Hagen, formerly of Königsberg, now of Cambridge, Massachusetts.

It is impossible to prepare dragon-flies for the cabinet so as to retain all the brilliant colours the bodies have in life. They are excessively brittle when dry, and in the smaller species it is advisable to run a bristle into the under side of the thorax, pushing it down till it reach the extremity of the abdomen, when the other end can be cut off close to the thorax. But the larger species should be disembowelled through a slit along the under surface of the abdomen, and then filled (but not too tightly) with clean white cotton wool. The colours stand a much better chance of not greatly altering if the insects be not killed until some hours after they are captured, so as to allow the contents of the intestinal canal to be naturally passed away, for it is the decomposition of the food that assists materially to alter or obliterate the colour and markings.

Among fossil insects dragon-flies hold a conspicuous position. Not only do they belong to what appears to have been a very ancient type, but in addition, the large wings and strong and dense reticulation are extremely favourable for preservation in a fossil condition, and in many cases all the intrinsic details can be as readily followed as in a recent example. In this country they have been found more especially in the Purbeck beds of Swannage, and the Vale of Wardour and Aylesbury, in the Stonesfield slate series, and in the Lias and Rhaetic series of the west of England. But the richest strata appear to be those of the Upper Miocene series at Geisingen, in the Rhine valley; the Middle Miocene at Ragghel, in Croatia; the Eocene of Aix, in Provence; and more especially the celebrated Secondary rocks furnishing the lithographic stone of Solenhofen, in Bavaria. This latter deposit would appear to have been of marine origin,
and it is significant that, although the remains of gigantic dragon-flies discovered in it are very numerous and perfect, no traces of their sub-aqueous conditions have been found, although numerous as a rule are numerous in most of the other strata, hence the insects may be regarded as having been drowned in the sea and washed on shores. Many of these Selenofen species differ considerably in form from those now existing, so that Dr Hagen, who has especially studied them, says that for nearly all it is necessary to make new genera. A notice of fossil forms should not be concluded without remark that indications of at least two species have been found in amber, a number disproportionately small if compared with other insects entombed therein, but it must be remembered that a dragon-fly is, as a rule, an insect of great power, and in all probability those then existing were able to extricate themselves if accidentally entangled in the resin.

See De Selys-Longchamps, Monographie des Libellulides d'Europe, Brussels, 1840; Synopses des Aegronomies, Colyoptères, Gomphides, et Cordulides, with Supplements, from Brussels to 1855 to 1877; De Selys-Longchamps and Hagen, Recueil des Odonates d'Europe, Brussels, 1856; Monographie des Cordulides et Gomphides, Brussels, 1854 and 1858; Charpentier, Libellulides européens, Leipsic, 1840.

**DRAGON'S BLOOD**, a name applied to the resins obtained from several species of plants. *Calamus Draco* (Willd.), one of the Rotiang or Rattan Palms, which produces much of the dragon's blood of commerce, is a native of Further India and the Eastern Archipelago. When young it grows erect, but with age it becomes climbing. The leaves are pointed, about a foot long, of a palm-leaves, and inferior kind, sold in lumps of considerable size and fixed and volatile oils, and in the pulp according to F. Johnston (Phil. Trans., 1859, p. 154), the composition C15H22O. If heated it gives off fumes of benzoin acid. In Europe it was once valued as a medicine on account of its astrigent properties, and is now used for colouring plasters, dentifices, and varnishes; in China, where it is mostly consumed, it is employed to give a red facing to writing paper. The drop dragon's blood of commerce, called *castor* by Piny (N. H. xxxii. 38), and *sangre de dragos* by Barbosa, was formerly and is still one of the products of Socotra, the Dioscorea insula of ancient geographers; it was known to the Arabs by the term *kitur*, from which the name of the island may have been derived (see A. Strenge, Atta Geographic, Arbores, 1875). It is the special exudation of a leguminous tree, *Pterocarpus Draca*, which grows at elevations between 800 and 2000 feet above sea-level (see Wellsted, Journ. R. Geog. Soc., 1835, p. 198). Jacquin states (Select. Stirpium Amor. Hist., p. 253, 1765) that the tree grows in the woods of Tripolis, off Carthage, and that its dragon's blood, obtained from it by incision, was at one time imported into Spain for medicinal purposes. The dragon's blood of the Canary Islands is a tonic and astrigent resin procured from the surface of the leaves and from cracks in the trunk of *Dracena Draca*, a tree of the natural order Liliaceae. The hardened juice of a euphorbiaceous tree, *Croton Draca*, a resin resembling kino, is the *sangre del drago* or dragon's blood of the Mexicans, used by them as a vulnerary and astrigent.

*Rumphius, Herbarium Amboinensis, p. v. 114-119, tab. Ixxv., 1747; Feuerberg and Hauy, Pharmacographia, 1874.*

**DRAGUIGNAN,** the chief town of the department of Var, in France, and of an arrondissement of the same name, on the River Fos, a branch of the Martuby, lies at the foot of the wooded height of Malmont, in 43° 33' 18" N. lat. and 6° 27′ 56″ E. long. The prefecture, palace of justice, theatre, hospital, and prison are the most important public buildings. The town possesses a communal college, a training school for teachers, a botanical garden, a fine promenade, a library of about 18,000 volumes, collections of coins, pictures, and natural history objects, and an archaeological society. The inhabitants, who in 1872 numbered 8177, are engaged in agriculture and the manufacture of woven, coarse cloth, earthenware, silk, soap, candles, oil, brandy, copper wares, and leather.

**DRAINAGE.** See Agriculture, Architecture, Building, and Sewage.

**DRAKE, Sir Francis** (c. 1545 - 1595), a celebrated English admiral, was born near Tavistock, Devonshire, about 1545 according to most authorities, but Barrow, in his life, says the date may have been as early as 1539. His father, a yeoman and a zealous Protestant, was obliged to take refuge in Kent during the persecutions in the reign of Queen Mary. He obtained a naval chaplaincy from Queen Elizabeth, and is said to have been afterwards vicar of Uphor Church, in the Medway. This, however, must be a mistake, as there is no evidence of any church ever having existed at Uphor. Young Drake was educated at the expense and under the care of Sir John Hawkins, who was his kinsman; and, after passing an apprenticeship on a coasting vessel, at the age of eighteen he had risen to be purser of a ship trading to Biscay. At twenty he made a voyage to Guinea; and at twenty-two he was made captain of the “Judith.” In that capacity he was in the harbour of San Juan de Ulloa, in the Gulf of Mexico, where he behaved most gallantly in the actions under Sir John Hawkins, and returned with him to England, having acquired great reputation, though with the loss of all the money which he had embarked in the expedition. In 1570 he obtained a regular privateering commission from Queen Elizabeth, the powers of which he immediately exercised in a cruise in the Spanish Main. Having next projected an attack upon the Spanish Indies to indemnify himself for his former losses, he set sail in 1572, with two small ships named the “Fasha” and the “Swan.” He was afterwards joined by another vessel; and with this small squadron he took and plundered the Spanish town of Nombre de Dios. With his men he penetrated across the isthmus of Panama, and committed great havoc among the Spanish shipping. From the top of a tree which he climbed while on the isthmus he obtained his first view of the Pacific, and resolved “to sail an English ship in these seas.” In these expeditions he was much assisted by a tribe of Indians, who were then engaged in a desultory warfare with the Spaniards. Having embarked his men and filled his ships with plunder, he bore away for England, and arrived at Plymouth on the 9th August 1573.

His success and honourable demeanour in this expedition gained him high reputation; and the use which he made of this riches served to raise him in the estimation of his countrymen.

Drake was at this time about 28 years of age. After the death of his
patron he returned to England, where Sir Christopher Hatton introduced him to Queen Elizabeth, and procured him a favourable reception at court. In this way he acquired the means of undertaking his great expedition which has immortalized his name. The first proposal he made was to undertake a voyage into the South Seas through the Straits of Magellan, which no Englishman had hitherto ever attempted. This project having been well received at court, the queen furnished him with means; and his own fame quickly drew together a sufficient force. The fleet with which he sailed on this enterprise consisted of only five small vessels, and their united crews mustered only 166 men. Having sailed on the 13th December 1577, he on the 25th made the coast of Barbary, and on the 29th Cape Verde. He reached the coast of Brazil on the 5th of April, and entered the Rio de la Plata, where he parted company with two of his ships; but having met them again, and taken out their provisions, he turned them adrift. On the 29th May he entered the port of St Julian's, where he continued two months for the sake of laying in a stock of provisions. On the 20th August he entered the Straits of Magellan, and on the 25th September passed them, having then only his own ship. On the 25th November he arrived at Macao, which he had appointed as the place of rendezvous in the event of his ships being separated; but Captain Winter, his vice-admiral, had repassed the straits and returned to England. He thence continued his voyage along the coast of Chili and Peru, taking all opportunities of seizing Spanish ships, and attacking them on shore, till his men were satiated with plunder; and then coasted along the shores of America, as far as 45° N. lat., in an unsuccessful endeavour to discover a passage into the Adriatic. Having landed, however, he named the country thence on the 29th November New Albion, and took possession of it in the name of his queen. His ship unfortunately struck upon a rock, but the loss of part of his crew and cattle was more than amply made good by the additional stores which he took on shore, till his men were satiated with plunder. On the 12th July, and on the 16th reached the coast of Cape Verde. He reached the Ionian Islands, where he watered. In 1587 he went to Lisbon with a fleet of thirty sail; and having received intelligence of a great fleet being assembled in the bay of Cadiz, and destined to form part of the Armada, he with great courage entered the port on the 1st April, and there burnt upwards of 10,000 tons of shipping,—a feat which he afterwards joyously called "angeing the king of Spain's beard." In 1588, when the Spanish Armada was approaching England, Sir Francis Drake was appointed vice-admiral under Lord Howard, and made prize of a very large galley, commanded by Don Pedro de Valdez, who was reputed the projector of the invasion, and who struck at once on learning his adversary's name.

It deserves to be noticed that Drake's name is mentioned in the singular diplomatic communication from the king of Spain which preceded the Armada:—

"Eseto ne perego hello defendere Belgias; Quae Dacus ejusdem non restitatur, eperit; Quae pater everit jubibo ter condere cellis: Belgis Pape fac restitatur ad anguem."

To these lines the queen made this extempore response:—

"Ad Grcmca, bone rex, sante mandata calendae."

In 1589 Drake commanded the fleet sent to restore Don Antonio, king of Portugal, the land forces being under the orders of Sir John Norris; but they had hardly put to sea when the commanders differed, and thus the attempt proved abortive. But as the war with Spain continued, a more formidable expedition was fitted out, under Sir John Hawkins and Sir Francis Drake, against their settlements in the West Indies, than had hitherto been undertaken during the whole course of it. Here, however, the commanders again disagreed about the plan; and the result in like manner disappointed public expectations. These disasters were keenly felt by Drake, and were the principal cause of his death, which took place on board his own ship, near the town of Nombre de Dios, in the West Indies, January 28, 1595.

See Lives of Drake by Samuel Clarke (1671) and John Barrow, Jun. (1843).
Drama (from δρᾶμα) signifies action. The term is applied to compositions which imitate action by representing the personages introduced in them as real and as employed in the action itself. The varieties of the drama differ more or less widely, both as to the objects imitated and as to the means used in the imitations. But they all agree as to the method or manner which is essential to the dramatic art, viz., imitation of the way of action.

The desire to give expression to feelings and conceptions is inseparable from human nature. Man expresses his thoughts and emotions by gestures and by speech, or by a combination of both; and these expressions he soon learns in the society of other men—and more especially on joyous or solemn occasions—to vary or regulate according to his own instincs. Another way of expression, often combined with the other, is imitation. To imitate, says Aristotle, is instinctive in man from his infancy; and from imitation all men naturally receive pleasure. Gesture and voice are means of imitation common to all human beings; and the aid of some sort of dress and decoration is generally within the reach of children, and of the childhood of nations. The assumption of character, whether real or fictitious, is therefore the earliest step towards the drama. But it is only a preliminary step; nor is the drama itself reached till the imitation extends to action.

Action, which man is not wont to attribute (except figuratively) to any but members of his own species and to the superior Beings or beings in whose existence and power he believes, implies an operation of the will and an execution of its resolution, whether or not amounting to a fulfillment of its purpose. It implies a procedure from cause to result. Action must therefore present itself to the human mind as having its source in a human or superhuman will. Every imitation of action by action is in germ a drama. But to this point not all nations have advanced.

After this step has been taken, it only remains for the drama to assume a form regulated by literature, of which art it thus becomes a branch. We may then speak of a dramatic literature; but this only a limited number of nations has come to possess. A nation may, however, have a drama without a dramatic literature; it may even continue in possession of the former after having ceased to cultivate the latter. On the other hand, both before and after the drama of a nation has assumed a literary form, it may allow one or more of its adventitious elements—music, dancing, decoration—predominantly to assert themselves, and thus eventually to bring about the formation of new, or the revival of discarded, dramatic species. But as a branch of literature the drama necessarily includes speech among its means of imitation; and its beginnings as such are accordingly, in the history of all literatures known to us, preceded by the beginnings of at least of other forms of poetic composition, the lyric and the epic, or by those of one of these forms at all events. It is in the combination of both that the drama in its literary form takes its origin in the case of all national civilizations in which it has found a place and with which we are more than superficially acquainted.

The art of acting is the indispensable adjunct of the dramatic art, while the aid of all other arts is merely an accident. But though really inseparable from one another, the courses of the dramatic and the histrionic arts do not at all times run parallel. The actor is only the temporary interpreter of the dramatist, though he may occasionally be left to supply some of the proper functions of his text-giver. On his side, the dramatist may in practice, though he cannot in theory, dispense with the actor's interpretation, but though the term literary drama is sometimes used of works kept apart from the stage, it is in truth a misnomer, since, properly speaking, no drama is such till it is acted.

The whole body of the laws and rules of the drama, Laws and could it be written down with completeness, would rules of the include, together with the ends proper to the art, the drama. means by which it is able to accomplish them. But neither the great authorities of dramatic theory—Aristotle or Lessing—nor the resolute apologists of more or less transitory fashions—a Corneille or a Dryden—have exhausted the exposition of the means which the drama may prove or may prove capable of employing. The multitude of technical terms and formulæ which has gathered round the practice of the art has at no time seriously interfered with the operation of creative power, whose inventive activity the existence of, accepted systems has frequently—in the Greek drama, for instance, and in the Spanish—served to stimulate. On the other hand, it is self-evident that no dramaturgic theory has ever given rise to a single dramatic work of enduring value, unless the creative force was there to animate the form.

The task of this creative force begins with the beginnings, Subject, of the dramatist's labours. For it is in the dramatic idea, and that the germ of the action of a play lies—not in the subject, which is merely its dead material. The story of the Scottish thane as it stood written in the chronicle, is the subject, not the action, of Macbeth. To convert a subject—whatever its kind or source—into the action or fable of a play is the primary task, which in its progressive development becomes the entire task, of the dramatist; and though the conception may expand or modify itself with the execution, yet upon the former the latter depends. The range of subjects open to a dramatist may be wide as the world itself, or it may be limited by usage, by imperious fashion, by the tastes and tendencies of a nation or an age, by the author's own range of sympathies, by a thousand restrictions of an historical, moral, or aesthetic origin, it may be virtually confined (as with the earlier Greek tragoliana) to a body of legend, or (as with the English comedians of the Restoration) to the social experiences of a particular epoch. But in all cases the transformation of the subject into the action is equally indispensable; and an imperfect transformation is (as in the old Chronicle Histories) the work of a rule, or (as in ninety-nine out of a hundred modern plays "founded upon fact") that of a careless method of dramatic production.

What, then, are the laws which determine the nature of Unity of all actions properly such, however they may vary either in action subjects or in form? In the first place, a dramatic action must possess unity—and that requirement at once distinguishes it from the subject which has suggested its idea. The events of real life, the facts of history, the incidents of narrative fiction, are like the waves of a ceaseless flood; that which binds a group or body of them into a single action is the bond of the dramatic idea, and this it is which the dramatist has to supply. Within the limits of a dramatic action all its parts claim to be connected together as contributions to a single stream; and upon the degree in which they are true to this purpose their primary dramatic significance depends. The unity of action which the drama should possess, therefore, means that everything in it should form a link in a single chain of cause and effect. This law is incumbent upon every kind of drama—alike upon the tragedy which solves the problems of a life,
and upon the farce which sums up the follies of an afternoon.

Such is not, however, the case with certain rules which have at different times been set up for this or that kind of drama, but which have no absolute validity for any kind. The supposed necessity that an action should consist of one event is an erroneous interpretation of the law that it should be, as an action, one. For an event is but an element in an action, though it may be an element of decisive moment. The assassination of Caesar is not the action of a Caesar tragedy; the loss of his treasure is not the action of The Miser. Again, unity of action does not exclude the introduction of one or even more subsidiary actions as contributing to the progress of the main action. The sole indispensable law is that these should always be treated as what they are—subsidiary only; and herein lies the danger in the use of that favourite device of the modern drama—bye or under-plots. On the other hand, a really double or multiple action, logically carried out as such, is inconceivable in a single drama; though there is many a play which as parts only two plays knotted into one. Every one is familiar with the dramatist who towards the drop of the curtain seems to be counting on his fingers whom he has killed or what couples he has to marry. Thirdly, unity of action need not imply unity of hero—for hero (or heroine) is merely a term signifying the principal personage of the action. And inasmuch as an action may consist in the joint contention of more than one against the same obstacle—as in the instance of The Seven against Thebes, or Romeo and Juliet—it is only when the change in the degree of interest excited by different characters in a play results from a change in the conception of the action itself, that the consequent duality (or multiplicity) of heroes recalls a faulty uncertainty in the conception of the action they carry on. Such is the objection applying to the crucial case of Schiller's Don Carlos. Lastly, the entirely arbitrary restrictions of unity of time and of place are not, like that of unity of action, absolute dramatic laws. Their object is by representing an action as visibly continuous to render its unity more distinctly or easily perceptible; but the effect of their observance cannot be to render it more really one. Thus they may in one sense be regarded as devices to avoid the difficulty experienced by the human mind in regarding an action as one when the eye beholds its different parts occurring in what are supposed to be different places, or when the process of its advance from cause to effect extends over what is supposed to be a considerable period of time. But the imagination is capable of constructing for itself the bridges necessary to preserve an action, conceived of as such, its character of continuousness. In another sense these rules were convenient usages conducing to a concise and clear treatment as actions of subjects in themselves of a limited nature; for they were a Greek invention, and the repeated resort to the same group of myths made it expedient for a Greek poet to seek the subject of a single tragedy in a part only of one of the myths open to him. The observance of unity of place, moreover, was suggested to the Greeks by certain outward conditions of their stage—as assuredly as it was adopted by the French in accordance with the construction and usages of theirs, and as the neglect and its consequences was in their case encouraged by the established form of the English scene. The palpable artificiality of these laws needs no demonstration, so long as the true meaning of the term action be kept in view. Of the action of Oedipus at Coluchus, King Oedipus takes place at Sicyon and part at Corinth, and yet the whole is one in itself, while the limits of time over which an action extends cannot be restricted by a revolution of the earth round the sun, or of the moon round the earth.

In a drama which presents its action as one, this action must be complete in itself. This law, like the first, distinguishes the dramatic action from its subject. The former may be said to have a real artistic, while the latter has only an imaginary real, completeness. The historian, for instance, aims indeed at a complete exposition of a body of events and transactions, and may even desire to show their working to a definite end; but he is aware that this aim can never be more than partially accomplished, since he may present only what he knows, and all human knowledge is partial. But art is limited by no such uncertainty. The dramatist, in treating an action as one, comprehends the whole of it in the form of his work, since to him who has conceived it, all its parts, from cause to effect, are equally clear. Accordingly, every drama should represent in organic sequence the several stages of which a complete action consists, and which are essential to it. This law of completeness therefore lies at the foundation of all systems of dramatic construction.

Every action, if conceived of as complete, has its causes, systems of growth, height, consequences, and close. There is no binding law to prescribe the relative length at which these several stages in the action should be treated in a drama, or to enforce a more or less exact correspondence between the successive presentation of each, and technical divisions, such as acts or scenes, which dramatic practice may find it convenient to adopt. Neither is there any law to assert any obligatory regulation of the treatment of such subsidiary actions as may be introduced in aid of the main plot, or of such more or less directly connected episodes which may at the same time advance and relieve its progress. But experience, as the parent of usage, has necessarily from time to time established certain rules of practice, from which the dramatist, working under customary forms, will find it neither easy, nor in most cases advantageous, to swerve too widely; and from the adoption of particular systems of division for particular species of the drama—such as that into five acts for a regular tragedy or comedy, which Roman example has caused to be so largely followed—has naturally resulted a certain uniformity of relation between the conduct of an action and the outward sections of a play. Essentially, however, there is no difference between the laws regulating the construction of a Sophoclean or Shakespearean tragedy, a comedy of Molière or Congreve, and a well-built modern farce. And this, because all exhibit an action complete in itself.

The introduction or exposition forms an integral part of Prologue the action, and is therefore to be distinguished from the pro- and epilogue logues in the more ordinary sense of the term, which, like the the beginn also the of accounts of action, and is a mere address to the public from author or actor occasioned by the play. Prologue and epilogue, greatly as they may have at times contributed to the success of a drama, are mere external adjuncts, and have as little to do with the construction of a play as the bill which announces it, or the musical prelude which disposes the mind for its reception. The introduction or exposition belongs to the Parts of action itself; it is, as the Hindu critics called it, the seed or from circumstance from which the business arises. Cleaness is a necessary introduction or exposition being its primary requisite, many expositions have been at times adopted to secure this feature. Thus, the Egyptian prologue, though curiosity of the play, takes a narrative form, and places itself half without, half within the action of which it properly is part. The same purpose is served by the separate inductions in many of our old English plays, and the preludes or prologues, or by whatever name they may call 1853.
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themselves, in numberless modern dramas of all kinds—from *Hamlet* down to the favourites of the Ambigu and the Adelphi. Another such expedient is that of the inductive dumb-shows, which sought to secure rapidity together with impressiveness of exposition by the process of pantomimic summary. Such, again, are the opening scenes in French tragedy between hero and confidant, and those in French comedy and its derivatives between observant valet and knowing lady’s-maid. But it is clear how all such expedients may be rendered unnecessary by the art of the dramatist, who is able outwardly also to present the introduction of his action as what it is—an organic part of that action itself; who seems to take the spectators as medicius res while he is really building the foundations of his plot; who can dramatically account for an idiot of woe without giving back to Leda’s egg; who touches in the opening of his action the chord which is to vibrate throughout its course—“Down with the Capulets! Down with the Montagues!”—“With the Moor, says thou.”

The introduction ends with the opening of the movement of the action, a passage which may prove highly effective to mark with the utmost distinctness (as in *Hamlet*, where it is clearly to be sought in the actual meeting between the hero and the ghost), but which in other instances is advantageously marked by the insertion of subsidiary action or episode (as in *King Lear*, where the opening of the movement of the main action would follow too sharply upon its exposition, were not the beginning of the subsidiary action of Glotre’s and his sons opportune introduced between them). From this point the second stage of the action—its growth—progresses to that third stage which is called its height or climax. All that has preceded the reaching of this constitutes that half of the drama—usually its much larger half—which Aristotle terms the *Basis*, or the foundation of the knot. The varieties in the treatment of the growth or second stage of the action are infinite, and it is here that the masters of the tragic and the comic drama—notably those unequaled weavers of intrigues, the Spaniards—are able most fully to exercise their inventive faculties. If the growth is too rapid, the climax will fail of its effect—and it is, therefore, at this stage that subsidiary actions and episodes are most largely used; if it is too slow, the interest will be exhausted before the greatest demand upon it has been made—a fault to which comedy is specially liable; if it is involved or inverted, a vague uncertainty will take the place of an eager or agreeable suspense, the action will seem to halt, or a fall will begin prematurely. In the contrivance of the climax itself lies one of the chief tests of the dramatist’s art; for while in the transactions of real life their climax is often only a matter of assumption, in the action of a drama its climax should present itself as self-evident. In the middle of everything, says the Greek poet, lies the strength; and this strongest or highest point it is the task of the dramatist to make manifest. Much here depends upon the niceties of constructive instinct; much (as in all parts of the action) upon a thorough dramatic transformation of the subject. The historical drama here presents peculiar difficulties, and perhaps the example of *Henry VIII.*, as compared with Shakespeare’s other historical plays, may be held to furnish an instructive example of defective (because hasty) workmanship.

From the climax, or height, the action proceeds through its fall to its close, which in a drama with an unhappy ending we still call its catastrophe, while to terminations in general we apply the term dénouement. This latter name would, however, more properly be used in the sense in which Aristotle employs its Greek equivalent *λήξις*—the cutting of the knot—of the whole of the second part, and not of the climax downwards. If, in the management of the climax, everything depended upon making the effect, in the fall everything depends upon not marring it. This may be ensured by a rapid progress to the close, but neither does every action admit of such treatment, nor is it in accordance with the character of those actions which are of a complicated kind. With the latter, therefore, the fall is often a return—έπειθής, in Aristotle’s phrase, a change into the reverse of what is expected from the circumstances of the action (σχεδεία),—as in *Conradina*, where the Roman story lends itself so admirably to such demands. In any case the art of the dramatist is in this part of his work called upon for the surest exercise of its tact and skill. The effect of the climax has been to concentrate the interest; the fall must therefore, above all, avoid dissipating it. The use of episodes is not even now excluded; but they must be of a more directly significant kind than is necessary in the earlier stages of the drama, even where serving the purpose of relief they must help to keep alive the interest previously raised to its highest pitch. This may be effected by a return or revolution; or again, by the raising of obstacles between the height of the action and its expected consequences, by the suggestion in tragedy of a seemingly possible recovery or escape from them (as in the wonderfully powerful construction of the latter part of *Macbeth*), by the gradual removal in comedy, or wherever the interest of the action is less intense, of such difficulties as the growth and climax have occasioned. In all kinds of the drama discovery will remain, as it was in the judgment of Aristotle, a most effective expedient; but it should be a discovery which has been foreshadowed by that method of treatment which in its consummate master, Sophocles, has been termed *lukros*. Nowhere should the close or catastrophe be other than a Close or consequence of the action itself. Sudden revulsions from catastrophe, the conditions of the action—such as the *deus ex machina*, or the revising officer of the emperor of China, or the nabob returned from India bring about—condemn themselves as unsatisfactory makeshifts. However sudden, and even, in manner of accomplishment, surprising, may be the catastrophe, it should not be unprepared, but like every other part of the action should preserve its organic connexion with the whole. The sudden suicides which terminate so many tragedies, and the paternal blessings which close an equal number of comedies, should be something more than a signal for the fall of the curtain.

The action of a drama, besides being one and complete in itself, ought likewise to be probable. The probable action of a drama is not that of actual or historical experience—it is a conditional probability, or in other words the consistency of the course of the action with the conditions under which, and with the characters by which, the dramatist has chosen to carry it on. As to the former, he is fettered by no restrictions save those which he imposes upon himself, whether or not in deference to the usages of certain accepted species of dramatic composition. Ghosts appear neither in real life nor in dramas of real life, but the introduction of supernatural agency is neither enjoined nor prohibited by any general dramatic law. The use of such expedients is as open to the dramatic as to any other poet; the judiciousness of his use of them depends upon the effect which, consistently with the general conduct of his action, they will exercise upon the spectator, whom other circumstances may or may not predispose to take it as an acceptance. The ghost in *Hamlet* belongs to the action of the play; the ghost in *Pericles* is not intrinsically less probable, but the apparition seems to spring, so to speak, less naturally out of the atmosphere around it. Dramatic probability has, however, a far deeper meaning than this. The *Examenides* is probable with all its primitive mysteriousness, and *Macbeth* with all its barbarous witchcraft. The proceedings of the feathered builders of Cloudbuckingtown VII — 50.
are as true to dramatic probability as are the pranks of Oberon's fairies. In other words, it is in the consistency of the action with the characters, and of the characters with themselves, that this dramatic probability lies. The dramatist has to represent characters affected by the progress of an action in a particular way, and contributing to it in a particular way, because, if consistent with themselves, they must be so affected, and so act.

Upon the invention and conduct of his characters the dramatist must therefore expend a great proportion of his labour. His treatment of them will, in at least as high a degree as his choice of subject, conception of action, and method of construction, determine the effect which his work produces. And while there are aspects of the dramatic art under which its earlier history already exhibits an unsurpassed degree of perfection, there is none under which produces. And while there are aspects of the dramatic art under which its earlier history already exhibits an unsurpassed degree of perfection, there is none under which its advance is more perceptible than this. Many causes may have contributed to this result; the chief is to be sought in the multiplicity of the opportunities for mankind's study of man. The theories of the Indian critics on the subject of dramatic character are a scaffolding more elaborate than the edifice it surrounds. Aristotle's remarks on the subject are scanty, and it may be unhistorical asserting that the strength of the dramatic literature from whose existence we are, abstracted his maxims to present their characters, as it were, ready made—whether in the case of tragic heroes and heroines, or in that of comic types, often moulded according to a long-lived system of local or national selection. It is in the Germanic drama, and in its master Shakespeare above all, that the individualization of characters has been carried to its furthest point, and that their significance has been allowed to work itself out in closest connection with the progress of the dramatic action to which they belong.

But, however, the method and scope of characterization may vary under the influence of different historical epochs and different tendencies or tastes of races or nations, the laws of this branch of the dramatic art are everywhere based on the same essential requirements. What interests us in a man or woman in real life, or in the impressions we form of historical personages, is that which seems to us to individualize them. A dramatic character must therefore, whatever its part in the action, be sufficiently marked in its distinctive features to interest the imagination; with these its subsequent conduct must be consistent, and to these its participation in the action must correspond. In order that such should be the result, the dramatist must first have distinctly conceived the character, whatever may have suggested it to him. If, for instance, he has taken it, as the phrase is, from history or from contemporary life, he must transform it, just as he must transform the subject of the action into the action itself. His task is not to paint a copy of any particular man, but to conceive a kind of man—of which a particular individual may have occurred to him as a suggestive illustration—under the operation of particular circumstances. His conception, growing and modifying itself with the progress of that action, will determine the totality of the character he creates. The likeness which the result bears to an actual or historical personage may vary, from secondary points of view, concern the success of his creation: upon its dramatic influence with a different sense from that in which Shakespeare used the words, it may be possible to say of every dramatic character which it is sought to identify with an actual personage, "This is not the man." The mirror of the drama is not a photographic apparatus.

Distinctiveness, as the primary requisite in dramatic characterization, is to be demanded in the case of all personages introduced into a dramatic action, but not in all cases in an equal degree. Schiller, in adding to the dramatiae personae of his Oedipus superscriptions of their chief characteristics, labels Esco as "an ordinary person," and his suffices for Esco. Between Bassanio's two unsuccessful rivals in the trial of the caskets there is difference enough for the dramatic purpose of their existence. But with the great masters of characterization a few touches, of which the true actor's art knows how to make the most, are not to be sought in the fulness or variety of its characterization. This relative deficiency the outward conditions of the Greek theatre—the remoteness of actor from spectator, and the consequent necessity for the use of masks, and for the raising and therefore conventionalizing of the tones of the voice—undoubtedly helped to occasion. Later Greek and Roman comedy, with a persistency furnishing a remarkable illustration of the force of habit, limited their range of characters to an accepted gallery of types. Nor is it easy to ignore the fact that these examples, and the influence of national tendencies of mind and temperament, have inclined the dramatists of the Romance nations to attach less importance to characterization of a closer and more varied kind than to interest of action and effectiveness of construction. The Italian and the Spanish drama more especially, and the French during a great part of its history, have in general shown a disposition to present their characters, as it were, ready made—whether in the case of tragic heroes and heroines, or in that of comic types, often moulded according to a long-lived system of local or national selection. It is in the Germanic drama, and in its master Shakespeare above all, that the individualization of characters has been carried to its furthest point, and that their significance has been allowed to work itself out in closest connection with the progress of the dramatic action to which they belong.

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takes part,—that is to say, the influence it exerts upon the progress of the action should correspond to its distinctive features, the conduct of the play should seem to spring from the nature of its characters. Hence even the minor characters should not idly intervene, and, before they intervene significantly, we should be prepared by some previous notion of them. The chief characters, on the other hand, should predominate over or determine the course of the action, its entire conception should harmonize with their distinctive features; it is only Frometheus whom the gods bind fast to a rock, only a Juliet who will venture into a living death for her Romeo. Thus in a sense chance is excluded from dramatic action, or rather, like every other element in it, bends to the dramatic idea and in view of this predominance of character over action, we may appropriately use such expressions as a tragedy of love or jealousy or ambition, or a comedy of character—by which is merely meant one whose preponderating interest lies in the effectiveness with which its conduct impresses upon the mind the conception of its chief character or characters.

The term manners (as employed in a narrower sense than the Aristotelian) applies to that which colours both action and characters, but does not determine the essence of either. As exhibiting human agents under certain conditions of time and place, and of the various relations of community existing or conceivable among men, the action of a drama, together with the characters engaged in it and the incidents and circumstances belonging to it, must be more or less suited to the external conditions assumed. From the assumption of some such conditions not even those dramatic species which indulge in the most sovereign licence, such as Old Attic comedy or burlesque in general, can wholly emancipate themselves; and even supernatural characters and actions must adapt themselves to some antecedents. But it depends altogether on the measure in which the nature of an action and the development of its characters are affected by considerations of time and place, or of temporary social systems and the transient distinctions they produce, whether the imitation of a particular kind of manners becomes a significant element in a particular play. What is of vanishing importance in one may be of unobjectionable value in another. The Hindu caste-system is an antecedent of every Hindu drama, and the peculiar organization of the Chinese society of nearly every Chinese with which we are acquainted. Greek tragedy itself, though treating subjects derived from no historic age, has established a standard of manners from which in its decline it did not depart with impunity. The imitation of manners of a particular age or country may or may not be of moment in a play. The conjunction of the Crusades is merely a felicitous choice for the time of action of Nathus the Wise; but the dramatic conflict of Mira\nna in Barnhardal derives half its life from the background of the Seven Years' War. In some dramas, and in some species of drama, time and place are so purely imaginary and so much a matter of indifference that the adoption of a purely conventional standard of manners, or at least exclusion of any definitely fixed one, is here desirable. The dual reign of Theseus at Athens (when ascended) does not date A Midsummer Night's Dream; nor do the coasts of Bohemia localize the manners of the characters of Autolycus. Where, on the other hand, as more especially in the historic drama, or in that kind of comedy which directs its shafts against the ridiculous vices of a particular age or country, the likeness of the manners represented to what is more or less known possesses significance, there the dramatist will use care in his colouring. How admirably is the French court specialized in Henry IV, how completely are we transplanted among the burghers of Brussels in the opening scenes of Eymond / What a picture of a claque we have in the Fréres
racleus of Molère; what a reproduction of a class in the pot-house politicians of Holberg! Yet even in such instances the dramatist will only use what suits his dramatic purpose; he will select, not transfer in mass, historic features, and discriminate in his use of modern instances. The details of historic fidelity, and the lesser shades distinguishing the varieties of social usage, he will introduce at his choice, or leave to be supplied by the actor. Where the reproduction of manners becomes the primary purpose of a play, its effect can only be of an inferior kind; and a drama purely of manners is a contradiction in terms.

No complete system of dramatic species can be abstracted from any one dramatic literature. They are often the result of particular antecedents, and their growth is often affected by peculiar conditions. Different nations or ages use the same name, and may preserve some of the same rules, for species which in other respects their usage may have materially modified from that of their neighbours or predecessors.

Who would undertake to define, except in their successive applications, such terms as tragedy-comedy or melodrama? Yet this does not imply that all is confusion in the terminology as to the species of the drama. In so far as they are distinguishable according to the effects which their actions, or those which the preponderating parts of their actions, produce, they may primarily be ranged in accordance with the broad difference established by Aristotle between tragedy and comedy. Tragic and comic effects differ in regard to the tragic and comic emotions of the mind which they excite; and a drama is tragic or comic according as such effects are produced by it. The strong or serious emotions are alone capable of exercising upon us that influence which, employing a bold but marvellously happy figure, Aristotle termed purification, and which a Greek comedian, after a more matter-of-fact fashion, thus expressed:

"For whosoever a man observes his fellow
Bear wrongs more grievous than his self has known,
More easily he bears his own misfortunes."

i.e., the petty troubles of self which disturb without elevating the mind are driven out by the sympathetic participation in greater griefs, which raises while it excites the mind employed upon contemplating them. It is to these emotions—which are and can be no others than pity and terror—that actions and characters to which we call tragic appeal. Those which we term comic address themselves to the sense of the ridiculous, and their subjects are those vices and moral impieties, the representation of which is capable of touching the springs of laughter. Where, accordingly, a drama excludes all effects except those of the former class, it may be called a pure tragedy, when all except those of the latter, a pure comedy. In those dramas where the effects are mixed, it is the nature of the main action and of the main characters (as determined by their distinctive features) which alone enables us to classify such plays as serious or humorous dramas—or as tragic or comic, if we choose to preserve the terms. But the classification admits of a variety of transitions, from pure tragedy to mixed, from mixed tragedy to mixed comedy, and thence to pure comedy and her sister farce. This method of distinction has no concern with the mere question of the termination of a play, according to which Philostratus and other authorities have sought to distinguish between tragic and comic dramas. The serious drama which ends happily (the German Schauspiel is not a species co-ordinate with tragedy and comedy, but only one subordinate to the former, if, indeed, it be necessary to distinguish it as a species at all. Other
are as true to dramatic probability as are the pranks of Oberon's fairies.

In other words, it is in the consistency of the action with the characters, and of the characters with themselves, that this dramatic probability lies. The dramatist has to represent characters affected by the progress of an action in a particular way, and contributing to it in a particular way, because, if consistent with themselves, they must be so affected, and must so act.

Upon the invention and conduct of his characters the dramatist must therefore expend a great proportion of his labour. His treatment of them will, in at least as high a degree as his choice of subject, conception of action, and method of construction, determine the effect which his work produces. And while there are aspects of the dramatic art under which its earlier history already exhibits an unsurpassed degree of perfection, there is none under which its advance is more perceptible than this. Many causes have contributed to this result; the chief is to be sought in the multiplication of the opportunities for mankind's study of man. The theories of the Indian critics on the subject of dramatic character are a weafolding more elaborate than the edifice it surrounds. Aristotle's remarks on the subject are scanty; and it may be unhesitatingly asserted that the strength of the dramatic literature from whose examples he abstrated his maxims is not to be sought in the variety of its characterization. This relative deficiency the outward conditions of the Greek theatre—the remoteness of actor from spectator, and the consequent necessity for the use of masks, and for the raising and therefore conventionalizing of the tones of the voice—undoubtedly helped to occasion. Later Greek and Roman comedy, with a persistency furnishing a remarkable illustration of the forces of habit, limited their range of characters to an accepted gallery of types. Nor is it easy to ignore the fact that these examples, and the influence of national tendencies of mind and temperament, have inclined the dramatists of the Romance nations to attach less importance to the characterization of a closer and more varied kind than to interest of action and effectiveness of construction. The Italian and Spanish drama more especially, and the French during a great part of its history, have in general shown a disposition to present their characters, as it were, ready-made, whether in the case of tragic heroes and heroines, or in that of comic types, often moulded according to a long-lived system of local or national selection.

It is in the Germanic drama, and in its master Shakespeare above all, that the individualization of characters has been carried to its furthest point, and that their significance has been allowed to work itself out in closest connection with the progress of the dramatic action to which they belong.

But, however the method and scope of characterization may vary under the influence of different historical epochs and different tendencies or tastes of races or nations, the laws of this branch of the dramatic art are everywhere based on the same essential requirements. What interests us in a man or woman in real life, or in the impressions we form of historical personages, is that which seems to us to individualize them. A dramatic character must therefore, whatever its part in the action, be sufficiently marked in its distinctive features to interest the imagination; with these its subsequent conduct must be consistent, and its effect on the action in the action itself. His task is not to paint a copy of any particular man, but to conceive a kind of man—which of a particular individual may have occurred to him as a suggestive illustration—under the operation of particular circumstances. His conception, growing and modifying itself with the progress of the action, will determine the totality of the character he creates. The likeness which the result bears to an actual or historical personage may very probably, from secondary points of view, concern the success of his creation; upon its dramatic effect this likeness can have no influence whatever. In a different sense from that in which Shakespeare used these words, it should be possible to say of every dramatic character which it is sought to identify with an actual personage, "This is not the man." The mirror of the drama is not a photographic apparatus.

Distinctiveness, as the primary requisite in dramatic characterization, is to be demanded in the case of all personages introduced into a dramatic action, but not in all cases in an equal degree. Schiller, in adding to the dramatis personae of his Perso superscriptions of their chief characteristics, labels Sacco as "an ordinary person," and this suffices for Sacco. Between Iassandros two unsuccessful rivals in the trail of the caskets there is difference enough for the dramatic purpose of their existence. But with the great masters of characterization a few touches, of which the true actor's art knows how to avail itself, distinguish even their lesser characters from one another; thus every man is in his humour down to the comic element thereby enormously increase the dramatic interest of the action. Elaboration is necessarily reserved for characters who are the more important contributors to the action, and the fulness of elaboration for its heroes. Many expedients may lend their aid to the higher degrees of distinctiveness. In characters designed to influence the whole of the action it must be a matter of the greatest importance; in others in due relation to their contribution towards the course of the plot. Much is gained by a significant introduction of hero or heroine,—so Antigone is dragged in by the watchman, Gloucester enters alone upon the scene, Volpone is discovered in adoration of his golden saint. Nothing marks character more clearly than the use of contrast,—of Othello with Iago, of Octavius with Max Piccolomini, of Joseph with Charles Surface. Nor is direct antithesis the only effective kind of contrast; Cassius is a foil to Brutus, and Leonora to her namesake the Princess. But besides impressing the imagination as self-concious, a conception distinct in itself, each character must tend toward the central unity of the action. A consistency between its conduct in the action and the features it has established as its own. This consistency does not imply uniformity; for, as Aristotle observes, there are characters which, to be represented with uniformity, must be presented as uniformly un-uniform. Of such end instantly complex characters the great critic cites no instance, nor indeed are they of frequent occurrence in Greek tragedy; in the modern drama Hamlet is their unrivalled exemplar; and Weiligen in Goethe's Gott, and Alcante in the Misanthrope, may be mentioned as other illustrations in dramas widely different from one another. It should be added that those dramatic literatures which freely admit of a mixture of the serious with the comic element thereby immensely increase the opportunities of varied characterization. The difficulty of the task at the same time enhances the effect resulting from its satisfactory solution; and if the conception of a character is found to bear a variety of tests resembling that which experience shows life to have at hand for every man, its naturalness, as we term it, becomes more obvious to the imagination. Naturalness is only another word for what Aristotelian terms propriety; the artificial rules by which usage has at times sought to define particular species of character are in their origin only a convenience of the theatre, though they have largely helped to conventionalize dramatic characterization. Lastly, a character should be directly effective with regard to the dramatic action in which it has its own place.
takes part—that is to say, the influence it exerts upon the progress of the action should correspond to its distinctive features, the conduct of the play should seem to spring from the nature of its characters. Hence even the minor characters should not only influence, but, before they intervene significantly, we should be prepared by some previous notion of them. The chief characters, on the other hand, should predominate over or determine the course of the action, its entire conception should harmonize with their distinctive features; it is only a Pyrame and Thisbe with the gods bound fast to a rock, only a Juliet who will venture into a living death for her Romeo. Thus in a sense chance is excluded from dramatic action, or rather, like every other element in it, bends to the dramatic idea.

And in view of this predominance of character over action, we may appropriately use such expressions as a tragedy of love or jealousy or ambition, or a comedy of character—by which is merely meant one whose preponderating interest lies in the effectiveness with which its conduct impresses upon the mind the conception of its chief character or characters.

The term manners (as employed in a narrower sense than the Aristotelian) applies to that which colours both action and characters, but does not determine the essence of either. As exhibiting human agents under certain conditions of time and place, and of the various relations of community existing or conceivable among men, the action of a drama, together with the characters engaged in it and the incidents and circumstances belonging to it, must be more or less suited to the external conditions assumed. From the assumption of some such conditions not even those dramatic species which indulge in the most sovereign licence, such as Old Attic comedy or burlesque in general, can wholly emancipate themselves, and even supernatural characters and actions must adapt themselves to some antecedents. But it depends altogether on the measure in which the nature of an action and the development of its characters are affected by considerations of time and place, or of temporary social systems and the transitory distinctions they produce, whether the imitation of a particular kind of manners becomes a significant element in a particular play. What is of vanishing importance in one may be an adjunct of inestimable value in another. The Hindu caste-system is an antecedent of every Hindu drama, and the peculiar organization of Chinese society of nearly every Chinese with which we are acquainted. Greek tragedy itself, though treating subjects derived from other age, has been rooted in a standard of manners from which in its decline it did not depart with impunity. The imitation of manners of a particular age or country may or may not be of moment in a play. The conjunction of the Crusades is merely a felicitous choice for the time of action of Nathan the Wise; but the dramatic conflict of Theseus vs. Barabola derives half its life from the background of the Seven Years' War. In some dramas, and in some species of drama, time and place are so purely imaginary and so much a matter of indifference that the adoption of a purely conventional standard of manners, or at least the admission of any definitely fixed one, is here desirable. The duel reign of Theseus at Athens (when ascertained) does not date A Midsummer Night's Dream; nor do the coasts of Bohemia localize the manners of the customers of Autolycus. Whereas, on the other hand, as more especially in the historic dramas, or in that kind of comedy which directs its shafts against the ridiculous wealth of a particular age or country, the likeness of the manners represented to what is more or less known possesses significance, there the dramatist will use care in his colouring. How admirably is the French court specialized in Henri V., how completely are we transplanted among the burghers of Brussels in the opening scenes of Eymons? What a picture of a clique we have in the Précieux ridicules of Molière; what a reproduction of a class in the pot-house politicians of Holberg! Yet even in such instances the dramatic plot only uses what suits his dramatic purpose; he will select, not transfer in mass, historic features, and discriminate in his use of modern instances. The details of historic fidelity, and the lesser shades distinguishing the varieties of social usage, he will introduce, at his choice, or leave to be supplied by the actor. Where the reproduction of manners becomes the primary purpose of a play, its effect can only be of an inferior kind, and a drama purely of manners is a contradiction in terms.

No complete system of dramatic species can be abstracted from any one dramatic literature. They are often the result of particular antecedents, and their growth is often affected by peculiar conditions. Different nations or ages use the same name, and may preserve some of the same rules, for species which in other respects their usage may have materially modified from that of the neighbours or predecessors. Who would undertake to define, except in their successive applications, such terms as tragic, comic or melodrama? Yet this does not imply that all is confusion in the terminology as to the species of the drama. In so far as they are distinguishable according to the effects which their actions, or those which the preponderating parts of their actions, produce, they may primarily be ranked in accordance with the broad difference established by Aristotle between tragedy and comedy. Tragic and comic effects differ in regard to the tragic and emotions of the mind which they excite, and a drama is comic, tragic or comic according as such effects are produced by it. The strong or serious emotions are alone capable of exercising upon us that influence which, employing a bold but marvellously happy figure, Aristotle termed purification, and which a Greek comedian, after a more matter-of-fact fashion, thus expressed:

"For whosoever a man observes his fellow
Bear wrongs more grieved than himself has known,
More easily he bears his own misfortunes,"

i.e., the petty troubles of self which disturb without elevating the mind are driven out by the sympathetic participation in greater griefs, which raises while it excites the mind employed upon contemplating them. It is to these emotions—which are and can be no others than pity and terror—that actions and characters which we call tragic appeal. Those which we term comic address themselves to the sense of the ridiculous, and their subjects are those vice and moral infirmities, the representation of which is capable of touching the springs of laughter. Where, accordingly, a drama excludes all effects except those of the former class, it may be called a pure tragedy; when all except those of the latter, a pure comedy. In those dramas where the effects are mixed, it is the nature of the main action and of the main characters (as determined by their distinctive features) which alone enables us to classify such plays as serious or humorous dramas—or as tragic or comic, if we choose to preserve the terms. But the classification admits of a variety of transitions, from pure tragedy to mixed, from mixed tragedy to mixed comedy, and thence to pure comedy and her slighter sister farce. This method of distinction has no concern with the mere question of the termination of a play, according to which Philostratus and other authorities have sought to distinguish between tragic and comic dramas. The serious drama which ends happily (the German Schauspiel) is not a species co-ordinate with tragedy and comedy, but only one subordinate to the former, if, indeed, it is necessary to distinguish it as a species at all. Other
distinctions may be almost infinitely varied according to the point of view adopted for the classification. The historical sketch of the drama attempted in the following pages will best serve to indicate the successive growth of national dramatic species, many of which by asserting their influence in other countries and ages than those which gave birth to them, have acquired a more than national significance.

The art of acting, whose history forms an organic though a distinct part of that of the drama, necessarily possesses a theory and a technical system of its own. But into these it is impossible here to enter. One claim, however, should be vindicated for the art of acting, viz., that though it is a dependent art, and most signal in its highest forms, yet its true exercise implies a creative process. The conception of a character is determined by antecedents not of the actor's own making; and the term originality can be applied to it only in a relative sense. Study and reflection enable him, with the aid of experience and of the intuition which genius bestows, but which experience may in a high degree supply, to interpret, to combine, and to supplement given materials. But in the transformation of the conception into the represented character the actor's functions are really creative; for here he becomes the character by means which belong to his art alone. The distinctive features to the character, making the mental and physical features recognized by him in its groundwork—the consistency which he maintains in it between groundwork and details—the appropriateness which he preserves in it to the course of the action and the part borne in it by the character—all these are produced by himself, though suggested by the conception he has derived from his materials. As to the means at his disposal, they are essentially of two kinds only; but not all forms of the drama have admitted of the use of both, or of either in the same completeness. All acting includes the use of gesture, what is appropriate to the expression of particular affections and of the mind and of their combinations, of emotions and passions, of physical and mental conditions—joy and grief, health and sickness, waking, sleeping, and dreaming, madness, collapse, and death—of particular ages of life and temperaments, as well as of the distinctive characteristics of races, nationality, or class. While under certain conditions—as in the masked drama—the use of bodily movement as one of the means of expression has at times been partially restricted, there have been, or are, forms of the drama which have altogether excluded the use of speech (such as pantomimes), or have restricted the manner of its employment (such as operas). In the spoken drama the laws of rhythm regulate the actor's use of speech, but under conditions of a special nature. Like the orator, he has to follow the laws of pronunciation, modulation, accent, and rhythm (the last in certain kinds of prose as well as in such forms of verse as he may be called upon to reproduce). But he has also to give his attention to the special laws of dramatic delivery, which vary in soliloquy and dialogue, and in such narrative or lyrical passages as may occur in his part.

The totality of the effect produced by the actor will in some degree depend upon other aids, among which those of a purely external kind will not be lost sight of. But the significance of costume in the actor, like that of the other elements of scenery in an action, is a wholly relative one, and is to a large measure determined by the claims which custom enables the theatre to make, or forbids its making, upon the imagination of the spectator. The actor's real achievement lies in the transformation which the artist makes of his own efforts; nor is there any apt term more congenial in the use it can make of its means, or so happy in the directness of the results it can accomplish by them.

The origin of the Indian drama may unhesitatingly be described as purely native. The Mahometans when they overran India brought no drama with them; the Persians, the Arabs, and the Egyptians were without a national theatre. It would be absurd to suppose the Indian drama to have owed anything to the Chinese or its offshoots. On the other hand, there is no real evidence for assuming any influence of Greek examples upon the Indian drama at any stage of its progress. Finally, it had found its way into its decline before the dramatic literature of modern Europe had sprung into being.

The earliest themes with the native mythology of Vishnû agrees with that ascribing the origin of a particular kind of dramatic performance—the sâyajû— to Kâshì and the shepherdesses. The author's later poem, the Gâgovinda, has been conjectured to be suggestive of the early species of Hindu dramas. But while the epic poetry of the Hindus gradually approached the dramatic in the way of dialogue, their drama developed itself independently out of the union of the lyric and the epic forms. Their dramatic literary stage arose later than the epic, its chief works, the Mahâbhârata and the Raâyâyana, had again been long preceded by the hymnody of the Vedas—just as the Greek drama followed upon the Homeric poems, and these had been preceded by the early hymns. The beginnings of the Indian drama may accordingly belong to the 5th century B.C., or to a rather earlier date. But by the time it produced the first specimens with which we are acquainted, it had already reached its zenith; and it was therefore looked upon as having sprung into being as a perfect art. We know it only in its glory, in its decline, and in its decay.

The history of Indian dramatic literature may be roughly divided into the following periods:—

I. From the 1st century B.C. to the 10th century A.D.—First period (classical). This period belongs to the pre-Mahometan age of Indian history, but to that second division of it in which Buddhism had already become a powerful factor in the social, as well as in the moral and intellectual, life of the land. It is the classical period of the Hindu drama, and includes the works of its two indisputably greatest masters. Of these Kâlîdâsa was by far the earlier, who lived at the
court of King Vikramaditya of Avanti (died 56 B.C.), being accounted the brightest of its "nine gems" of genius. He is the author of Sākuntala,—the work Sir William Jones's translation of which first revealed to the Western world of letters the existence of an Indian drama. It is a dramatic love-dyll of surpassing beauty, and, in the opinion of the highest authorities, one of the master-pieces of the poetic literature of the world. Kālidāsa's other dramas, Vikrama and Uṇāshi (The Hero and the Nymph), though unequal as a whole to Sākuntala, contains one act of incomparable loveliness, and its enduring effect upon Indian dramatic literature is shown by the imitations of it in later plays. To Kālidāsa has likewise been attributed a third play—the Mālāvākiyānimitra; but it is doubtful whether this comedy, though held to be of ancient date, was not composed by a different poet of the same name.

Another work of high merit, the pathetic Mrdhchakañcika (The Toy-Cart), a domestic drama with a public underplot, may possibly belong to the close of the 2nd century A.D., and seems certainly of an earlier date than the 10th. It is attributed (as is not uncommon with Indian plays) to a royal author named Śūlakaka.

The palm of pre-eminence is disputed by Kālidāsa by the great dramatic poet Babhavātī (called Cṛkitāṭha, or he in whose throat is fortune), who flourished in the earlier part of the 8th century. While he is considered more artificial in language than his rival, and in general more bound by rules, he can hardly be deemed his inferior in dramatic genius. Of his three extant plays, Mahāvīra-Charitra and Uttara-Rāma-Charitra are heroic dramas concerned with the adventures of Rāma (the seventh incarnation of Viṣṇu); the third, the powerful Mālaṅ and Mādeva, has love for its theme, and has been called (with more aptitude than such comparisons usually possess) the Romeo and Juliet of the Hindus. It is considered by their critical authorities the best example of the prakrāta, or drama of domestic life.

Among the remaining chief works of Indian dramatic literature, the Vedā-Sūtrakīta is thought probably to date from about the 8th or 9th century. Its author's name seems doubtful; the play is described as one in which both pathos and horror are exaggerated, and which in the violence of its action recalls the manner of Shakespeare's predecessors. The next series of plays forms a transition between the first period of Indian dramatic literature and II. The period of decline, which may be reckoned from about the 11th to about the 14th century of our era, and of which the playing of the plays passed with the monkish times, was one of continuous series of Mahometan invasions of India. Hanumān-Nālaka, or "the great Nālaka" (for this play, the work of several hands, surpasses all other Indian dramas in length, extending over not less than fourteen acts), dates from the 10th or 11th century. Its story is taken from the Rāmacycle, and a prominent character in it is the mythical monkey-chief Hanumān, to whom, indeed, tradition ascribed the original authorship of the play. Krīṣhṇa-māmā's "theosophic mystery," as it has been called, of Prabhodha-Chandragotra (The Rise of the Moon of Knowledge, i.e., the victory of true doctrine over error), is ascribed by one author to the middle of the 11th century, by another to about the end of the 12th. The dates of the famous Rāmatāla (The Necklace), a court-comedy of love and intrigue, with a half-Terentian plot, and of the interesting Bareh-Prakāsa (The Necklace, or Nāthādīya, which begins as an erotic play but passes into a most impressive exemplification of the supreme virtue of self-sacrifice, depend on the disputed question of their respective authorship. One of them belongs to the first quarter of the 12th century, the other to an earlier time. Finally, Vaiśhṇavātta's interesting drama of political intrigue, Mādura-Rakhasa (The Sogey of the Minister), in which prince Chandragupta, presumably identifiable with Sandrocottus, makes his appearance, was probably composed later than the end of the 12th century.

This is only Indian play known to us with an essentially historical fable—a noteworthy circumstance, if (as is most likely) it was produced at a time when the Mahometan invasions had already begun.

The remaining plays of which it has been possible to conjecture the dates range in the time of their composition from the end of the 11th to the 14th century, and belong to the period of decline. Of this period, as compared with the first, the general characteristics seem to be an undue preponderance of narrative and description, and an affected and over-elaborated style. As a striking instance of this class is mentioned a play on the adventures of Rāma, the Anargha-Rāghava, which, in spite, or by reason, of the commonplace character of its sentiments, the extravagance of its diction, and the obscurity of its mythology, is stated to have enjoyed a reputation with the pandits of the present age than the master-pieces of Kālidāsa and Babhavātī. To the end of this period, the 14th century, has likewise (but without any pretension to certainty) been ascribed the only Tamil drama of which we possess an English version, Arivandira (The Martyr of Truth) exemplifies—with a strange likeness in the contrivance of its plot to the Book of Job and Psalms—in the trials of a heroically enduring king the maxim "Better die than live."

III. Isolated plays remain from centuries later than the Tamil 14th, but these, which chiefly turn on the legends of Krīṣhṇa (the last incarnation of Viṣṇu), may be regarded as a mere aftergrowth, and exhibit the Indian drama in its decay. Indeed, the latest of them, Catura-Yajna, which was composed about the beginning of the present century, and still serves as a model for Bengali dramatic performances, is imperfect in its dialogue, which (after the fashion of Italian improvised comedy) is left to the actors to supplement. Besides these there are farces or farcical entertainments, more or less indecided, of uncertain dates.

The number of the plays which have descended to us from so vast an expens of time is both relatively and absolutely small. Wilson doubts whether all the plays to be found, and three may be reckoned, by Hindu writers on the dramatic system, amount to more than 60, and it has been seen that not more than three are ascribed to either of the two great masters. To these should be, however, added the plays in Tamil, stated to be about 100 in number, and to have been composed by a few actors who enjoyed the patronage of the Pandian kings of Madura. On the other hand, there is among the Hindus no death of dramatic theory. The Critical Sage Bhārata, the reputed inventor of dramatic entertainments, was likewise revered as the father of dramatic criticism—a combination of functions to which the latter days of the English theatre might perhaps furnish an occasional parallel. The commentators (possibly under the influence of inspiration rather than as a strict matter of memory) constantly cite his sūtras, or aphorisms. (From sūtra, thread, was named the sūtra-dhāra, thread-holder, carpenter, a term applied to the architect and general manager of sacrificial solemnities, then to the director of theatrical performances). By the 11th century, when the drama was already approaching its decline, dramatic criticism had reached an advanced point; and the Pannā-Rāpaka (of which the text belongs to that age) distinctly defines the ten several kinds of dramatic composition. Other critical works followed at later dates, exhibiting a rage for sublimation unsurpassed by the efforts of Western theorists, ancient or modern; but should not be examples remaining (if they ever existed) to illustrate all the branches of so elaborate a dramatic system.
"What," inquires the manager of an actor in the induction to one of the most famous of Indian plays, "are those qualities which the viruous, the wise, the learned, and the Brahmans require in a drama?" "Profound exposition of the various passions," is the reply, "pleasing interchanges of mutual affection, loftiness of character, delicate expression of desire, a surpassing story, and elegant language." "Then," says the manager (for the Indian dramatics, though we may term them, like Ben Jonson, and "to rail" the public "into approbation," are unaffected by maquerre honte) "I recollect one." And he proceeds to state that "Babharoti has given us a drama composed by him, replete with all qualities, to which indeed this sentence is applicable, "How little do they who speak of us with censure! This entertainment is not for them. Possibly some one exists, or will exist, of similar tastes with myself; for time is boundless, and the world is wide." This self-possessed disregard of popularity, springing from an imperturbable consciousness of lofty aims, accounts for much that is characteristic of the higher class of Indian plays. It explains both their paucity and occasions, chiefly of length, renders Brahmans, with religious worship, they were only performed on solemn occasions, chiefly of a public nature, and more especially at seasons sacred to some divinity. Thus, though they might in some instances be reproduced, they were always written with a view to one particular solemn representation. Again, the greater part of every one of the plays of Northern India is written in Sanskrit, which ceased to be a popular language by 300 a.c., but continued the classical, and at the same time the sacred, form of speech of the Brahmans. Sanskrit is spoken by the heroes and principal personages of the plays, while the female and inferior characters use varieties, more or less refined, of the Prakrit languages (as a rule not more than three, that which is employed in the songs of the women being the poetical dialect of the most common Prakrit language, the Čaurasæni). Hence, part at least of each play cannot have been understood by the large majority of the audience, except in so far as their general acquaintance with the legends or stories treated enabled them to follow the course of the action. Every audience thus contained an inner audience, which could alone feel the full effect of the drama. It is, then, easy to see why the Hindu critics should make demands upon the art, in which they are more highly-trained and refined intellects were capable of entering, or called upon to enter. The general public could not be expected to appreciate the sentiments expressed in a drama, and thus (according to the process prescribed by Hindu theory) to receive instruction by means of amusement. These sentiments are termed rasa (tastes or flavours), and said to spring from the bádhas (conditions of mind and body). A variety of subdivisions is added; but the saňcita rasa is logically enough excluded from dramatic composition, as much as it implies absolute quiescence.

The Hindu critics know of no distinction directly corresponding to that between tragedy and comedy, still less of any determined by the nature of the close of a play. For, in accordance with the child like element of their character, the Hindus dislike an unhappy ending to any story, and a positive rule accordingly prohibits a fatal conclusion in their dramas. The general term for all dramatic compositions is rásapakā (from rás, form), those of an inferior class being distinguished as uparáspakā. Of the various subdivisions of the rásapakā, in a more limited sense, the nálaka, or play proper, represents the most perfect kind. Its subject should always be celebrated and important—it is viruously either heroism or love, and most frequently the latter—and the hero should be a demigod or divinity (such as Ráma in Babharoti's hero play) or a king (such as the hero of Śakuntala). But although the later poets took their plots from the sacred writings or Puránas, they held themselves at liberty to vary the incidents,—a licence from which the later poets abstained. Thus, in accordance, perhaps, with the respective developments in the religious life of the two peoples, the Hindu drama in this respect reversed the early drama. The prakarasas agree in all essentials with the nálaka except that they are less elevated; their stories are more fictitious, taken from actual life in a respectable class of society. Among the species of the uparáspakā may be mentioned the talañaka, in which the personages are partly human, partly divine, and of which a famous example remains. Of the báhasa, a monologue in one act, one literary example is extant—a curious picture of manners in which the speaker describes the different persons he meets as a spring festival in the streets of Kolahalar. The nature of the farcical prakarasas is usually directed against the hypocrisy of ascetics and Brahmans, and the sensuality of the wealthy and powerful. These trifles represent the lower extremes of the dramatic scale, to which, of course, the principles that follow only partially apply. Unity enjoined by the Hindu theory. The "nauté".

With the solemn character of the higher kind of Pro-dramatic performances accord the rules and prohibitions priorum, defining what may be called the proprieties of the Indian drama. Not only should death never be inflicted on a popular, but the various operations of luting, scratching, kissing, eating, sleeping, the bath, and the marriage ceremony should never take place on the stage. Yet such rules are made to be occasionally broken. It is true that the mild humour of the siddhásaka is restricted to his "gastenlating eating", instead of perpetrating the obnoxious act. The charming love-scene in the Śakuntala (at least in the earlier recension of the play) breaks off just as the hero is about to act the part of the bee to the honey of the heroine's lips. But later writers are less squeamish, or less refined. In two dramas the heroine is dragged from the stage by her braid of hair; and this outrage, a worse one than that imputed to Danstan, is in both instances the motive of the action. In a third, sleeping and the marriage ceremony occur in the course of the representation.

The dramatic construction of the Indian plays presents Construs no very striking peculiarities. They open with a benediction.

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1. e.g., Mṛchakaṭṭi; Mālāṭi and Mālaṭara.
2. Vācura and Gāruḍa; Cūcum, Panjića.
3. Śakuntala, Ulula-Ráma-Khariśvarī.
5. Nágānanda, act i.
7. Veda-Sambhara; Prachanda-Fanhdva.
8. Vidhū-Shākunīshya.
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Indian.]  

Drama (nāḍā), followed by "some account" of the author, and by an introductory scene between the manager and one of the actors, which is more or less skilfully connected with the opening of the play itself. This is divided into acts (ākōla) and scenes; of the former a nāḍak should have not fewer than 5, or more than 10; 7 appears a common number; "the great nāḍako" reaches 14. Thus has the length of the higher class of Indian plays is considerable—about that of an Eschylean trilogy, but not more than a single play was ever performed on the same occasion. Comic plays are restricted to two acts (here called sandhā). In theory the scheme of an Indian drama corresponds very closely to the general outline of dramatic construction given above, it is a characteristic merit that the business is rarely concluded before the last act. The piece closes, as it began, with a benediction or prayer. Within this framework is found for situations as ingeniously devised and highly wrought as those in any modern Western play. What could be more pitiful than the scene in Sākuntalā, where the true wife appears before her husband, whose remembrance of her is fatally overclouded by a charm; what more terrible than that in Malātī and Madhu Bobby, where the lover resigned has beheld from the horrors of the charnel field? Recognition—especially between parents and children—frequently gives rise to scenes of a pathos which Euripides has not surpassed. The ingenious device of a "play within the play" (so familiar to the English drama) is employed with the utmost success by Babhavūti. On the other hand, miraculous metamorphosis and, in a later play, vulgar magic lend their aid to the progress of action. With scenes of strong effectiveness contrast others of the more delicate poetic grace—such as the inexpressibly lovely episode of the two dancers of the god of love and his queen on the meadows of the Nandī hill. In many of the scenes of the two damsels of the god of love and his queen on the meadows of the Nandī hill. Inact II, the lovers are separated, and the chief interest of the play passes off to scenes of a kind rarely kept free from affectation in the modern drama. For the diminution in the narrower sense of the term the Indian dramatist largely resort to the expedient of the deus ex machīna, often in a sufficiently literal sense.

Characters. Every species of drama having its appropriate kind of hero or heroine, theory here again amuses itself with an infinitude of subdivisions. Among the heroes are to be noticed the courtesans, whose social position to some extent resembles that of the Greek hero, and association with whom does not seem in practice, however, it may be in theory, to be regarded as dishonorable even to Brahman society. In India, the Indian drama indicates relations between the sexes subject to peculiar restraints of usage, but freer than those which Mahometan example seems to have introduced into higher Indian society. The male characters are frequently drawn with skill, and sometimes with genuine force. Prince Sāmabhavikā in the purple worthy to rank besides figures of the modern drama, of which this has at times naturally been a favourite class of character; elsewhere the intrigues of ministers are not more fully exposed than their characters and principles of action are judiciously discriminated. Among the lesser personages common in the Indian drama, two are worth noticing, as corresponding though by no means precisely to familiar types of other dramatic literatures. These are the wid, the accomplished but dependent companion (both of men and women), and the jāthābhās, the humble associate (not servant) of the prince, and the butt of the action. Strangely enough, he is always a Brahman, or the pupil of a Brahman. His humour is to be ever intent on the pleasures of a quiet life, and on that of eating in particular, his jokes are always devoid of both harm and point.

Thus, clothing itself in a diction always ornate and Oriental tropical, in which (as Buckett has happily expressed) the proles is the warp and the verse the woof, in which (as Goethe says) words become allusions, allusions similes, and amilies metaphors, the Indian drama essentially depended upon its literary qualities, and upon the familiar sanctity of its favourite theses, for such effect as it was able to produce. Of scenic apparatus it knew but little; the simple devices of scenery by which exits and entrances were facilitated it is unnecessary to describe, and on the contrivances it resorted to for such "properties" as were required (above all, the cars of the gods and of their emusories) it is useless to speculate. Propriety of costume, on the other hand, seems always to have been observed, agreeably both to the peculiarities of the Indian drama and to the habits of the Indian people. The munsters of an art practised under such conditions actors could not but be regarded with respect, and spared the contempt or worse, which, except among one or other great civilized people, the Greeks, has everywhere at one time or another been the actor's lot. Companies of actors seem to have been common in India at an early date, and the inductions show the players to have been regarded as respectable members of society. In late if not in earlier times individual actors enjoyed a widespread reputation,—"all the world" is acquainted with the talents of Kalaha-Kandala. The directors, as already stated, were usually Brahmanas. Female parts were in general, though not invariably, represented by females. One would like to know whether such was the case in a piece where—after the fashion of more than one Western play—a crafty minister passes off his daughter as a boy, on which assumption she is all but married to a person of her own sex.

The Indian drama would, if only for purposes of comparison, be invaluable to the student of this branch of literature, but from the point of view of purely literary excellence it holds its own against all except the very foremost dramas of the world. It is, indeed, a mere periphrasis of Kalaha-Dasa the Indian Shakespeare—a title which, moreover, if intended as anything more than a synonym for poetic pre-emmience, might fairly be disputed in favour of Babhavūti, while it would be absolutely misleading to place a dramatic literature of the Hindūs beside the Greek or Latin. The larger and more quintessence of the culture of a caste, the Indian has been the actor's lot. But as a whole, the Indian drama is a sort of scholastic system of religious philosophy, self-conscious of its completeness. To the power of Fate is occasionally ascribed a supremacy, to which gods as well as mortals must bow; but it may be asserted of the whole of its beauty and moral effort at the same time points to the summit of possibilities, and self-sacrifice is the supreme condition both of individual perfection and of the progress of the world. Such conceptions as these seem at once to...
enfold and to overshadow the moral life of the Indian drama. The affections and passions forming part of self it delineates with a fidelity to nature which no art can neglect; but the freedom of the picture is restricted by conditions which to us are unfamiliar and at times seem intolerable, but which it was impossible for the Indian poet's imagination to neglect. The sheer self-absorption of ambition or love appears inconceivable by the minds of any of these poets; and their social philosophy is always based on the system of caste. On the other hand, they are masters of many of the truer forms of pathos, above all of that which blends with resignation in humour of a delicate kind they are by no means deficient; to its lower forms they are generally strangers, even in productions of a professionally comic intention. Of wit, Indian dramatic literature—though a play on words as the breath of its nostrils—furnishes hardly any examples intelligible to Western notions.

The distinctive excellence of the Indian drama is to be sought in the poetic robe which envelops it as flowers overspread the bosom of the earth in the season of spring. In its nobler productions, at least, it is never untrue to its half religious, half rural origin; it weaves the wreaths of idyllic fancies in an unbroken chain, adding to its favourite and familiar blossoms ever fresh beauties from an inexhaustible store. To its admirers it is unequal to depicting the finer aspects of nature in her mighty forests and on the shores of the ocean. A profound familiarity with its native literature can here alone follow its lineament, its outline, its character, with an accuracy we cannot profess to control, into four phases, the noble garden. Nor is it unequal to depicting the mango tree. But the poetic beauty of the Indian drama has continued to be left aside by any lover of the earlier pieces treating of the fortunes of an hero to the imperial throne, who was preserved in a mysterious box like another Cypselus or Moses. Voltairse seized the theme of the earlier play for a rhetorical tragedy, in which he coolly professes it was his intention to paint the manners of the Chinese and the Tartars. The last play, which is something less elevated in the rank of its characters, and very decidedly less refined in treatment, was afterwards translated by Stanislaus Julien; and to the labours of this scholar, of Sir J. F. Davis, and of Basin the elder, we owe a series of translated Chinese dramas, among which there can be no hesitation in designating the master-piece. The justly famous Pi-Pa-Ki (The Story of the Lute) belongs to a period rather later than that of the Yuen plays, having been composed towards the close of the 14th century by Kao-Tong-Kiu, and reproduced in 1404, under the Ming dynasty, with the alterations of Mao-Taeu, a commentator of learning and taste. Pi-Pa-Ki, which as a domestic drama of sentiment possesses very high merit, long enjoyed a quite exceptional popularity in China; it was repeatedly republished with laudatory prefaces, and so late as the 18th century was regarded as a monument of morality, and as the master-piece of the Chinese theatre. It would seem to have remained without any worthy competitors, for although it had been originally designed to produce a reaction against the immorality of the drama then in vogue, especially of Wang-Chi-Fou's celebrated Si-Siang-Ki (The Story of the Western Pavilion), yet...
CHINESE DRAMA

Drama as reflected in the drama seems one in which creed eludes creed, and superstitions are welcome whatever their origin. Of all religious traditions and doctrines, however, those of Buddhism (which had reached China long before the known beginnings of its drama) are the most perceptible; thus, the theme of absolute self-sacrifice is treated in one play, that of entire absorption in the religious life in another. The historical drama is not unknown to the Chinese; and although a law prohibits the bringing on the stage of “emperor, empresses, and the famous princes, ministers, and generals of former ages,” no such restriction is observed in practice. In Hun-Kong-Tsou (The Sorrows of Han), for instance, which treats a national historic legend strangely recalling in parts the story of Esther and the myth of the daughter of Ezechceus, the Emperor Yuen-Ti (the representative, to be sure, of a fallen dynasty) plays a part, and a sufficiently sorry one. By far the greater number, however, of the Chinese plays accessible in translations belong to the domestic species, and to that sub-species which may be called the criminal drama: Their favourite virtue is purity, of a formal kind, to parents or parents-in-law; their favourite interest lies in the discovery of long-hidden guilt, and in the vindication of persecuted innocence. In the choice and elaboration of such subjects they leave little to be desired by the most ardent devotees of the literature of agony. Besides this description of plays, we have at least one love-comedy pure and simple—a piece of a nature not “tolerably mild,” but ineffably harmless.

Range of characters

Free in its choice of themes, the Chinese drama is likewise remarkably unrestricted in its range of characters. Chinese society, it is well known, is not based, like Indian, upon the principle of caste; rank is in China determined by office, and this again depends on the results of examination. These familiar facts are constantly brought home to the reader of Chinese plays. The T'oo-hong-Yuen, or senior classman on the list of licentiates, is the flower of Chinese society, and the hero of many a drama; and it is a proud boast that for years “one's ancestors have held high posts, which they owed to their literary successes.” On the other hand, a person who has failed in his military examination, becomes, as if by a natural transposition, a murdering monster. But of more class the Chinese drama as a no respecter, painting with noteworthy freedom the virtues and the vices of nearly every phase of society. The same liberty is taken with regard to the female sex: it is clear that in earlier times there were few vexatious restrictions in Chinese life upon the social intercourse between men and women. The variety of female characters in the Chinese drama is great, ranging from the heroine who sacrifices herself for the sake of an empire to the well brought-up young lady who averts that “woman came into the world to be obdurate, to unravel skeins of silk, and to work with her needle.” From the chambermaid who contrives the most genteel sentiment of renderance, to the reckless courtesan who, like another Millwood, upbraids the partner of her guilt on his suing for mercy, and holds the hero in hopes of a re-union after death. In marriage the first or legitimate wife is distinguished from the second, who is at times a cx-devant, and towards whom the feelings of the former vary between bitter jealousy and suavely kindness.

The conduct of the plays exhibits much ingenuity, and construct an aversion from restrictions of time and place, in fact, and conduct of the plot.

The conduct of the plays exhibits much ingenuity, and construct an aversion from restrictions of time and place, in fact, and conduct of the plot.
The JAPANESE DRAMA, as all evidence seems to agree in showing, still remains what in substance it has always been—an amusement passionately loved by the lower orders, but dignified by no literature deserving the name. Apart from its native elements of music, dance, and song, and legendary or historical narrative and parody, it is clearly to be regarded as a Chinese importation; nor has it in its more advanced forms apparently ever attempted to emancipate itself from the reproduction of the conventional Chinese types. As early as the close of the 6th century Hada Kawanu, a man of Chinese extraction, but born in Japan, is said to have been ordered to arrange entertainments for the benefit of the country, and to have written as many as thirty-three plays. The Japanese, however, ascribe the origin of their drama to the introduction of the dance called Surandae as a charm against a volcanic depression of the earth which occurred in 809; and this dance appears still to be used as a prelude to theatrical exhibitions. In 1108 lived a woman called Ie no Zenji, who is looked upon as "the mother of the Japanese drama." But her performances seem to have been confined to dancing or posturing in male attire (oko-man); and the introduction of the drama proper is universally ascribed to Saruwaka Kanzaburo, who in 1654 opened the first theatre (naba) at Yedo. Not long afterwards (1651) the play-houses were removed to their present site in the capital; and both here and in the provincial towns, especially in the north, the drama has continued to flourish. Persons of rank are never seen at these theatres; but actors are occasionally engaged to play in private at the houses of the nobles, who appear formerly themselves to have taken part in performances of a species of opera affected by them, always treating patriotic legends and called nob. The Mikado only has a court theatre.

The subjects of the popular plays are to a large extent historical, though the names of the characters are changed. An example is to be found in the Kotoni, or musical romance, in which the universally popular tale of Chushingura (The Loyal Vengeurs) has been amplified and adapted for theatrical representation. This famous narrative of the feudal fidelity of the forty-seven ronin, who about the year 1699 revenged their chieftain judicial suicide upon the arrogant official to whom it was due, is strolling rather than touching in its incidents, and contains much bloodshed, together with a tea-house scene which suffices as a specimen of the Japanese comedy of manners. One of the books of this dramatic romance consists of a metrical description, mainly in dialogue, of a journey which (after the fashion of Indian plays) has to be performed on the stage. Other popular plays are mentioned dealing with similar themes, besides which there are domestic dramas of a very realistic kind, and often highly improper, though all intrigues against married women are excluded. Fairy—

On the other hand, the merits of this dramatic literature are by no means restricted to ingenuity of construction and variety of character-merits, in themselves important, which no candid criticism will deny to it. Its master-piece is not only truly pathetic in the conception and the main situations of its action, but includes scenes of singular grandeur and felicity of treatment—such as that where the re-married husband of the deserted heroine in vain essays in the presence of his second wife to sing to his new lute, now that he has cast aside the old. In the last act of a tragedy appealing at once to patriotism and to pity, there is true imaginative power in the picture of the emperor, whose very life is not spared by the terror of the death of his beloved, sitting in solitude broken only by the ominous shriek of the wild fowl. Nor is the Chinese drama devoid of humour. The lively abiga who has to persuade her mistress into confessing herself in love by arguing (almost like Beatrice) that "humanity bids us love men;" the corrupt judge (a standing type of the Chinese plays) who falls on his knees before the prosecuting parties to a suit as before the father and mother who give him sustenance, may serve as examples; and in Pe-Pa-Ki there is a scene of admirable burlesque on the still more characteristic theme of the humours of a competitive examination. If such illustrations could not easily be multiplied, they are at least worth citing in order to deprecate a perfunctory criticism on the qualities of a dramatic literature as to which our materials for judgment are still scanty.

While the north of China houses are temporarily set apart for dramatic performances, in the south these are usually confined to theatres erected in the streets (Hi-Thai). Thus scenic decorations of any importance must always have been out of question in the Chinese theatre. The costumes, on the other hand, are described as magnificent; they are traditionally those worn before the 17th century, in accordance with the historical colouring of most of the plays. The actor's profession is not a respectable one in China, the managers being in the habit of buying children of slaves and bringing them up as slaves of their own. Women may not appear on the stage, since the emperor Khien-Long admitted an actress among his concubines; female parts are therefore played by lads, occasionally by eunuchs.

1 Pe-Pa-Ki, s.v. 14 2 Sorrows of Han.
3 Tocai-Mei-Emang, act xi. 4 Pe-Pa-Ki, s.v. 1 of Jot-Lam-Ka.
5 Pe-Pa-Ki, s.v. 5. 6 Pe-Pa-Ki, s.v. 14.
Drama

The civilization and religious ideas of the Egyptians so vitally influenced the people of whose drama we are about to speak that a reference to them cannot be altogether omitted. The influence of Egyptian upon Greek civilization has probably been over-estimated by Herodotus, but while it will never be clearly known how much the Greeks owed to the Egyptians in divers branches of knowledge, it is certain that the former confessed themselves the school of Egypt in the cardinal doctrine of its natural theology. The doctrine of the immortality of the soul there found its most solemn expression in mysterious recitations connected with the rites of sepulture, and treating of the migration of the soul from its earthly to its eternal abode.

Traces of a drama exist in any of the other civilized peoples of Asia—for that in Siam may probably be regarded as a branch of the Indian. Among the Hebrews and other Semitic peoples, as well as in at least one originally Aryan people of Asia which has cultivated letters with assiduity and success—the Persians—the dramatic art is either wanting, or only appears as an occasional and exotic growth. It is unnecessary to dwell on the dramatic element apparent in two of the books of the Hebrew Scripture—the Book of Ruth and the Book of Job. Of the dramatic element in the religious rites of the Egyptians a word will be said immediately, meanwhile it may be convenient at once to state that traces of dramatic entertainments have been found in various parts of the New World, which it cannot be part of the present sketch to pursue. Among these are the performances, accompanied by dancing and intermingled with recitation and singing, of the South Sea Islanders, first described by Captain Cook, and lately introduced to the notice of students of comparative mythology by Mr. W. Wyatt Gil. Of the so-called Inca drama of the Peruvians, the unique relic, Apu Olantay, said to have been written down in the Quichua tongue from native dictation by Spanish priests shortly after the conquest of Peru, has been partly translated by Mr. Clements Markham, and recently twice rendered into German verse. It appears to be an historic play of the heroic type, combining stirring incidents with a pathos finding expression in at least one lyric of some sweetness—the lament for the lost Collyar. With it may be contrasted the ferocious Aztec dramatic ballet, Xalotl-Achs (translated by the Abbé de Bourbourg), of which the text seems rather a succession of warlike harangues than an attempt at dramatic treatment of character. But these are mere isolated curiosities.

Greek drama, as it received its later growth, is at once so active and so fluid as flexible in its anthropomorphic formations, that no other religious system has ever so victoriously assimilated to itself foreign elements, or so vivaciously and variously developed its own. The worship of Dionysus, introduced into Greece by the Phoenicians as that of the tauroimana sun-god whom his worshippers adored with loud cries (whence Bacchus or Bacchus), and the god of generation (whence his phallic emblem) and production, was brought into connection with the Doric religion of the sun-god Apollo. Apollo and his sister, again, corresponded to the Pelasgian and Achaean divinities of sun and moon, whom the Phoenician Dionysus and Demeter superseded, or with whose worship theirs was blended. Dionysus, whose rites were specifically conducted with reference to his attributes as the wine-god, was attended by defied representations of his original worshippers, who wore the skin of the goat sacrificed to him. These were the satyrs. Out of the connected worship of Dionysus, Bacchus, Apollo, and Demeter sprang the beginnings of the Greek drama.

"Both tragedy and comedy," says Aristotle, "originated in a rude and unpremeditated manner,—the first from the leaders of the dithyramb, and the second from those who added the satyric elements to it. The diversity of origin, and the distinction jealously maintained down to the latest times between the two branches of the dramatic art, even where they might seem to come into actual contact with one another, necessitate a separate statement as to the origin and history of each separately.

The custom of offering thanks to the gods by hymns andOrigin of and songs of the dances in the places of public resort was first practised by the Greeks in the Doric states, whose whole system of life was organized on a military basis. Hence the dances of the Dorians originally taught or sustained the movements of soldiers, and their hymns were warlike chants. Such were the beginnings of the chorus, and of its songs (called peana, from an epithet of Apollo), accompanied first by the phorminx and then by the flute. A step in advance was taken when the poet with his trained singers and dancers, like the Indian śāra-chātra, performed these religious functions as the representative of the population. From the Doric peana a very early period several styles of choral dancing formed themselves, to which the three styles of dance in scenic productions—the tragic, the comic, and the satyric—are stated afterwards to have corresponded. But none of these could have led to a literary growth. This was due to the introduction among the Dorians of the dithyramb,—originally a song of revelers, probably led by the flute-player and accompanied by the music of other Eastern instruments, in which it was customary in Crete to celebrate the birth of Bacchus (the doubly-born) and possibly also his later adventures. The leader of the band
Lyric tragedy.

(coryphæus) may be supposed to have at times assumed the character of the wine-god, whose worshippers bore aloft the vase-clad thyrsus. To this thyrsus was reëliged to a definite form by the Lesbian Arion (fl. 610), who composed regular poems, turned the moving band of worshippers into a standing or cyclic chorus, invented a style of music adapted to the character of the chorus—the ἀργικός or goat style—and called these songs goat-songs, or tragoediae. Hence the invention of lyrical tragedy—a transition stage between the dithyramb and the regular drama. His invention, or the chorus with which it dealt, was established according to fixed rules by his contemporary Stevechius. About the same time that Arion introduced these improvements into the Dorian city of Corinth, the (likewise Dorian) Families at Scydon honoured the hero-king Adрастus by tragic choruses. Hence the invention of tragedy was ascribed by the Sicyoniens to their poet Epigenes; but this step, significant for the future history of the Greek drama, of employing the Bacchic choruses for the celebration of other than Bacchic themes, was soon annulled by the tyrant Clasthenes.

The element which transformed lyrical tragedy into the tragic drama was added by the Iouans. The custom of the recitation of poetry by wandering minstrels called rhapsodes, sailors, or from καταβας, to pause together) first sprang up in the Ionian beyond the sea; to such minstrels was due the spread of the Homeric poems and of subsequent epic cycles. These recitations, with or without musical accompaniment, soon included gnostic or didactic, as well as epic, verse; if Homer was a rhapsode, so was the Sententious or "moral" Hesiod. The popular effect of these recitations was enormously increased by the metrical inventions of Archilochus (from 708), who invented the trochee and the σαμβος, the latter the arrowy metre which is the native form of natural invective—the species of comic composition in which Archilochus excelled—though it was soon used for other purposes also. The recitation of these iambics may already have nearly approached to theatrical declamation. The rhapsodes were welcome guests at popular festivals, where they exercised their art in mutual emulation, or ultimately recited parts, perhaps the whole, of longer poems. The recitation of a long epic may thus have resembled theatrical dialogue; what of alternating iambic poems, the form being frequently an address in the second person, even more so. The rhapsode was in some sense an actor; and when these recitations reached Attica, they thus brought with them the germ of theatrical dialogue.

The rhapsodes were actually introduced into Attica at a very early period; the θίανδ, we know, was chanted at the Brauronia, a rural festival of Bacchus, whose worship had early entered Attica, and was cherished among its rustic population. Meanwhile the cyclic chorus of the Dorians had found its way into Attica and Athens, even since the Athenians had recognized the authority of the great centre of the Apolline religion at Delphi. It therefore only remained for the rhapsoid and the cyclic—in other words, for the epic and the choral—elements to coalesce; and this must have been brought about by a union of the two accompaniments of religious worship in the festive rites of Bacchus, and by the domestication of these rites in the ruling city. This occurred in the time of Pausistratus, perhaps after his restoration in 534. To Thespis (535), said to have been a contemporary of the tyrant and a native of a Dacician deme (Icaria), the invention of tragedy is accordingly ascribed. Whether his name be that of an actual person or not, his claim to be regarded as the inventor of tragedy is founded on the statement that he introduced an actor for the sake of relieving the Dionysian chorus. Thus, the representative of the rhapsoids, and doubtless, at first, generally the poet himself, instead of merely alternating his recitations with the songs of the chorus, addressed his speech to its leader—the coryphæus—with whom he thus carried on a species of dialogue. The chorus stood round its leader upon the steps of the Bacchic altar (thyrsus), the actor was placed upon a table. The table is the predecessor of the stage, for the wagon of Thespis is a fiction, probably due to a confusion between his table and the wagon of Susarion. It is a significant minor invention ascribed to Thespis, that he disguised the actor's face first by means of a pigment, afterwards by a mask. In the dialogue was treated a myth relating to Bacchus or some other deity or hero. Whether the god Thespis actually wrote tragedies (and there seems no reason to doubt it), and although both the cyclic chorus and rhapsodic recitation continued in separate use, tragedy was now in existence. The essential additions afterwards made to its simple framework were remarkably few. Aeschylus added a second actor, and by reducing the functions of the chorus further established the dialogue as the principal part of the action. Sophocles added a third actor, by which change the preponderance of the dialogue was made complete.

If the origin of Greek comedy is simpler in its nature than that of Greek tragedy, the beginnings of its progress are involved in more obscurity. It is said to have been invented by Susarion, a native of Megara, whose inhabitants were famed for their coarse humour, which they communicated to their colonies in Sicily. In this island, to this day the home of spontaneous merriment, comedy was to have arisen. In the rural Bacchic vintage-festivals of bands of jolly companions (σάλπιγγες) properly a revel continued after supper) went about in carts or afoot, carrying the phallic emblem, and indulging in the ribald licence of wanton mirth. From the song sung in these processions or at the Bacchic feasts, which combined the praise of the god with gross personal ridicule, and was called comus in a secondary sense, the Bacchic reveler taking part in it was called a comus-singer or comoxus. These phallic processions, which were afterwards held at Athens as in all Greek cities, imparted their character to Old Attic comedy, whose essence was personal exhibition. The recitation of the recitations is thus independent of one another in their origin, Greek tragedy and comedy never actually coalesced. The satyr-drama, though in some sense it partook of the nature of both, was in its origin as in its history connected with tragedy alone. Phrynias, a contemporary of Aeschylus in his earlier days, is said to have restored the tragic chorus to the satyrs, i.e., he first produced dramas the same in form and theme as the tragedies, but in which the dances were different and entirely carried on by satyrs. The tragic poets, while never writing comedies, henceforth also composed satyr-dramas; but neither tragedies nor satyr-dramas were ever written by the comic poets, and it was in conjunction with tragedies only that the satyr-dramas were performed. The theory of the Platonic Socrates, that the same man ought to be the best tragic and the best comic poet, was never exemplified in practice. The so-called Tragikos-tragedy or tragic-comedy of later writers, though in comedy, some of its features to have been anticipated by Euripides, in form nowise differed from tragedy; it merely contained a comic element in its characters, and invariably had a happy ending. The serious and sentimental element in the comedy of Menander and his contemporaries did far more to destroy the essential difference between the two great branches of the Greek dramatic art.

The history of Greek—which virtually always remained the drama of the tragedian—tragedy divides itself into three periods.

A L E X A N D R E A .
The uncontestable pre-eminence of the three great tragic poets acknowledged at Athens by the usage allowing them no tragedies but those to be more than once performed, and by the law of Lycurgus (c. 330) which obliged the actors to use, in the case of the great masters, authentic rev. copies preserved in the public archives. It is thus not impossible that the value of later Attic tragedy, of which the fertility continued considerable, has been overrated. In all the names of 1400 tragedies and satyr-dramas are preserved, and tragic poets are mentioned of whose plays no names are known. Among the more celebrated Attic tragedians contemporary with the great writers, Ion of Chios (d. before 412) seems to have followed earlier traditions of style than Euripides, Agathon, who survived the latter, on the other hand, introduced certain innovations of a transmortal kind into the art of tragic composition.

III. Of the third period of Greek tragedy the concluding limit cannot be precisely fixed. Down to the days of Alexander the Great, Athens remained the chief home of tragedy. Though tragedies must have begun to be acted at the Syracusan and Macedonian courts, since Eschylus, Homer of the Euripides, and Agathon had sojourned there,—though the practice of producing plays at the Dionysia before the allies of Athens must have led to their holding similar exhibitions at home,—yet before the death of Alexander we meet with no instance of a tragic poet writing or a tragedy written outside Athens. An exception should indeed be made in favour of the tyrant Dionysus of Syracuse, who (like Critias in his earlier days at Athens) was "addicted to" tragic composition. Not all the tragedians of this period, however, were Athenians born, though the names of Euphorion, the son of Eschylus, Sophocles, of whom the son of the same name, and Sophocles, Euripides and Sophocles, the nephew and the grandson respectively of their great namesakes, illustrate the descent of the tragic art as an hereditary family possession.

Soon after the death of Alexander theatres are found spread over the whole Hellenic world of Europe and Asia—a result to which the practice of the conqueror and his father of celebrating victories by scene performances had doubtless contributed. Alexandria having now The Alex becomes a literary centre with which even Athens was in India some respects unable to compete, while the latter still retained the home of comedy, the tragic poets flocked to the capital of the Ptolemies, and here, in the house of Ptolemy Philadelphus (283–247) flourished the seven tragic poets famed as the "Plebes," who still wrote in the style and followed the rules observed by the Attic masters. Tragedy and the dramatic art continued to be favoured by the later Ptolemies, and about 100 B.C. we meet with the curious phenomenon of a Jewish poet, Ezechiel, composing Greek tragedies, of one of which (the Eudos from Egypt) fragments have come down to us. Tragedy, with the satyr-drama and comedy, survived in Alexandria beyond the days of Cleopatra and Varro, nor was their doom finally sealed till the Emperor Caracalla abolished the-theatrical performances in the Egyptian capital in 217 A.D. During the whole of its productive age Greek tragedy seems to have adhered to the lines laid down by its great masters; nor were these in most respects departed from by the Roman imitators of these poets and their successors. Tragedy was defined by Plato as an imitation of the noblest life. Its proper themes—the deeds and sufferings of heroes—were familiar to audiences interested in the mythology of the national religion. So much Greek tragedy almost wholly confined itself; and in later days there were numerous books which discussed these
myths of the tragedians. They only very exceptionally treated historic themes, though one great national calamity, and a yet greater national hero, and in later times a few other historical subjects, were brought upon the stage. Such veiled historical allusions as critical ingenuity has sought not only in passages but in the entire themes of other Attic tragedies cannot, of course, even if accepted
as such, stamp the plays in which they occur as historic dramas. No doubt Attic tragedy, though after a different and more decorous fashion, shared the tendency of hpr
comic sister to introduce allusions to contemporary events and persons; and the indulgence of this tendency was facilitated by the revision (rearrangement) to which the works of the great poets were subjected by them, or by those who produced their works after them. So far as we know, the subjects of the tragedies before Aeschylus were derived from the poets; and it was a famous saying of this poet that his dramas were but dry scraps from the great banquet of Homer—an expression which may be understood as including the poems which belong to the so-called Homeric cycles. Sophocles, Euripides, and their successors likewise resorted to the Trojan, and also to the Heraclean and the Theban myths, and to Attic legend in general. To Theban, to Troy, to Medea, to the law of Lycurgus applied to the Cyclops, to the themes of Greek tragedy, the Trojan myths always retained so prominent a place that Lucian could jest on the universality of their dominion. Purely invented subjects were occasionally treated by the later tragedians; of this innovation Agathon was the originator.

Theophrastus is said to have introduced the use of a prologue and a rhēs (speech)—the former being probably the opening speech recited by this solitary actor, the latter the dialogue between actor and chorus. It was a natural result of the introduction of the second actor that a second rhēs should likewise be added; and this tripartite division would be the earliest form of the trilogy—three sections of the same myth forming the beginning, middle, and end of a single drama, marked off from one another by the choral songs. From this Aeschylus proceeded to the treatment of these several portions of a myth in three separate plays, conducted together by their subject and by being performed in sequence on a single occasion. This is the Aeschylean trilogy, of which we have only one extant example, the Orestes,—as to which critics may differ whether Aeschylus adhered in it to his principle that the strength should lie in the middle—in other words, that the interest should center in the second play. In any case, the symmetry of the trilogy was destroyed by the practice of performing after it a satyr-drama, probably, as a rule, if not always, connected in subject with the trilogy, which thus became a tetralogy, though this term, unlike the other, seems to be a purely technical expression invented by the learned.

Sophocles, a more conscious and probably a more self-
critical artist than Aeschylus, may be assumed from the fact to have elaborated his plots with greater care; and to this, as well as to his innovation of the third actor, which materially added to the fulness of the action, we may attribute his introduction of the custom of contending for the prize with single plays. It does not follow that he never produced connected trilogies, though we have no example of such by him or any later author; on the other hand, there is no proof that either he or any of his successors ever departed from the Aeschylean rule of producing three tragedies, followed by a satyr-drama, on the same day. This remained the third and last stage in the history of the construction of Attic tragedy. The tendency of its Complexity of action towards complication was a natural progress, and was approved by Aristotle. This complication, in which Euripides excelled, led to his use of prologues, in which one of the characters opens the play by an exposition of the circumstances under which its action begins. This practice, though railed at by Aristophanes, was too convenient not to be adopted by the successors of Euripides, and Menander transferred it to comedy. As the dialogue increased in importance, so the dramatic significance of the chorus diminished. While in Aeschylus it mostly, and in Sophocles occasionally, takes part in the action, its songs could not be more approach the character of lyrical interludes; and this they openly assumed when Agathon began the practice of inserting choral songs (embolisms) which had nothing to do with the action of the play. In the general contrivance of their actions it was only natural that, as compared with Aeschylus, Sophocles and Euripides should exhibit a greater latitude and ingenuity; but the palm due to a treatment at one point adhering to the substance of the ancient legends and original in an effective dramatic treatment of them must be given to Sophocles. Euripides was, moreover, less skilful in uniting complicated actions than in weaving them; hence his frequent resort to the deva ex machina, which Sophocles employs only in his latest play.

The other distinctions to be drawn between the dramatic characters of the three great tragic masters must be mainly based upon a critical estimate of the individual genius of each. In the characters of their tragedies, Aeschylus and Sophocles avoided those lapses of dignity with which from one point of view Euripides has been charged by Aristophanes and other critics, but which from another connect themselves with his humanity. If his men and women are less heroic and statuesque, they are more like men and women. Aristotle objected to the later tragedians that, compared with the great masters, they were deficient in the drawing of character—by which he meant the lofty drawing of lofty character. In diction, the transition is even more perceptible from the "helmed phrases" of Aeschylus, who had Milton's love of long words and sonorous proper names, to the play of Euripides' "smooth and dextrous tongue;" but to a sustained style even he remained essentially true, and it was reserved for his successors to introduce into tragedy the "low speech"—i.e., the conversational language—of comedy. Upon the whole, however, the Euripidean diction seems to have remained the standard of later tragedy, the flowery style of speech introduced by Agathon finding no permanent favour.

Finally, Aeschylus is said to have made certain reforms Improvements in tragic costume of which the object is self-evident,—to have improved the mask, and to have invented the corders or buxuin, upon which the actor was raised to

1 Phrynichus, Capture of Miletus.
2 Id., Phthiasos; Aeschylus, Persae (Persa-trilogy).
3 Medon; Choephoros; Thesmophoros; lymphroth, Marathonos; Carthage; Seds; Philema; Thesmophoros.
4 Aeschylus, Suppliants; Thesmophoros; Vincta; Dendra-

5 Trilogy; Sophocles, Antigone; Oedipus Colonus; Eumolpos, Medea.

6 Phithiasos; Scopas. 7 Quide from this revision was the passage against which the fool of Lycurgus was directed, of "cobbling and letting" the drama of the great masters by alterations of a kind familiar enough to the students of Shakespeare as improved by Colley Cibber. The later tragedians also appear to have occasionally transposed long speeches from one tragedy to another—a device introduced by the Roman dramatists, and called collationem by Latin writers.
8 One satyr-drama only is preserved to us, the Oedipus of Euripides, a dramatic version of the Homeric tale of the visit of Odysseus to Polypheemas. Lymphroth, one of the poets of the Pleas, by using the satyr-scene as a vehicle of personal ridicule, applied it to a purpose like that of Old Attic comedy.

9 Ton; Sophocles; Iphigeneia in Tauris; Electra; Helen; Hypolytus; Andromache.
10 Philoctetes.
lofter stature. Euripides was not afraid of rage and tatters; but the sarcasms of Aristophanes on this head seem feeble to those who are aware that they would apply to King Lear as well as to Telephus.

The history of Greek comedy is likewise that of an essentially Attic growth, although Sicilian comedy was earlier in date than its Attic sister or descendant. The former is represented by Epicharmus (fl. 500), and by the names of one or two other poets. It probably had a chorus, and, dealing as it did in a mixture of philosophical discourse, anti-ethical rhetoric, and wild buffoonery, necessarily varied in style. Though in some respects it seems to have resembled the Middle rather than the Old Attic comedy, its subjects sometimes, like those of the latter, coincided with the myths of tragedy, of which they were doubtless parodies. The so-called mimes of Sophron (fl. 430) were dramatic scenes from Sicilian life, intended, not for the stage, but for recitation.

Attic comedy is usually divided into three periods or species, viz. —

I. OLD COMEDY, which dates from the complete establishment of democracy by Pericles, though a comedy directed against Themistocles is mentioned. The Megarian farcical entertainments had long spread in the rural districts of Attica, and were now introduced into the city, where Cratinus and Crates (fl. 450) first moulded them into the forms of Attic art. The final victory of Pentes and the democratic party may be reckoned from the ostracism of Thucydides (444), and so eagerly was the season of freedom employed by the comic poets that already four years afterwards a law — which was, however, only a short time in force — limited their licence. Cratinus, an exceedingly bold and broad satirist, apparently of conservative tendencies, was followed by Eupolis (416—after 415), every one of whose plays appears to have attacked some individual, by Phrynickus, and others; but the representative of old comedy in its fullest development is Aristophanes (c. 444—c. 380), a comic poet of unique and unsurpassed genius. Dignified by the acquisition of a chorus (though of a less costly kind than the tragic), of masked actors, and of scenery and machinery, and by a corresponding literary elaboration and elegance of style, Old Attic comedy nevertheless remained true both to the spirit and to the purposes of its introduction into the free imperial city. It borrowed much from tragedy, but it retained the phallic abandonment of the old rural festivals, the licence of word and gesture, and the audacious directness of personal invective. These characteristics are not features peculiar to Aristophanes. He was twitted by some of the older comic poets with having degenerated from the full freedom of the art by a tendency to refinement, and he took credit to himself for having superseded the time-honoured canons and the stale practical joking of his predecessors by a nobler kind of mirth. But in boldness, as he likewise boasted, he had no peer; and the shafts of his wit, though dipped in woeless and at times feathered from very obscene bow, flew at high game. He has been accused of seeking to degrade what he ought to have recognized as good; and it has been shown with complete success that he is not to be taken as an impartial or accurate authority on Athenian history. But partisan as he was, he was also a genuine patriot; and his very political sympathies — which were conservative — were such as have often stimulated the most effective political sarcasm, because they imply an antipathy to every species of excess. Of the conservative quality of reverence he was, however, altogether devoid; and his

love for Athens was that of the most free-spoken of Sons. Flexible even in his religious notions, he was in this as in other respects ready to be educated by his times, and, like a true comic poet, he could be witty at the expense even of his friends, and, it might almost be said, of himself. In wealth of fancy, and in beauty of lyric melody, he ranks high among the great poets of all times.

The distinctive feature of Old, as compared with Middle Comedy, is the parabasis, the speech in which the chorus, moving towards and facing the audience, addressed it in the name of the poet, often abandoning all reference to the action of the play. The loss of the parabasis was involved in the loss of the chorus, of which comedy was deprived in consequence of the general reduction of expenditure upon the comic drama, culminating in the law of Cinesias (396). But with the downfall of the independence of Athenian public life, the ground had been cut from under the feet of its most characteristic representative. The catastrophe of the city (405) had been preceded by the temporary overthrow of the democracy (411), and was followed by the establishment of an oligarchical "tyranny" under Spartan protection; and when liberty was restored (406), the citizens for a time addressed themselves to their new life in a soberer spirit and continued (or passed) the law prohibiting the introduction by name of any individual as one of the personages of a play. The change to which comedy had to accommodate itself was one which cannot be defined by precise dates, yet it was not the less inevitable in its progress and results. Comedy, in her struggle for existence, now chiefly devoted herself to literary and social themes — such as the criticism of tragic poets, and the literary praise of women's rights — and the transition to Middle Comedy accomplished itself. Of the later plays of Aristophanes, three are without a parabasis, and in the last of those preserved to us the chorus is quite insignificant.

II. MIDDLE COMEDY, whose period extends over the Middle, remaining years of Athenian freedom, thus differed in substance as well as in form from its predecessor. It is represented by the names of thirty-seven writers (more than double the number of poets attributed to Old Comedy) among whom Eubulus, Aristophanes, and Alexis are stated to have been pre-eminent in fertility and success. Middle comedy of manners as well as of character, although its ridicule of particular classes of men tended to the creation of standing types, such as parasites, courtiers, revellers, and — a favourite figure already drawn by Aristophanes — the self-conceited cook. In style it necessarily became more easy and conversational; while in that branch which was devoted to the parodying of tragic myths, its purpose may have been to ridicule, but its effect must have been to degrade. This species of the comic art had found favour at Athens already before the close of the great civil war; its inventor was the Thasian Hegemon, at whose Gigantomachia the Athenians were laughing on the day when the news arrived of the Sicilian disaster.

III. NEW COMEDY, which is dated from the establishment of Macedon. If its favourite types were more numerous, including the captain (of mercenaries) — the original of a long line of comic favourites — the cunning slave, etc., they were probably more conventional. New Comedy appears to have first constituted love intrigues the main subject of dramatic action. The most famous of the 64 writers said to have belonged to this period of comedy were Philonion (fl. from 330), Menander (342-291), Philionion and Menander.

6 6 6

5 Pericles.

8 Philemon and Menander.
and his contemporary Diphilus. Of these, authors we know something from fragments, but more from their Latin adapters Plautus and Terence. As courtesans of character, they were limited by a range of types which left little room for originality of treatment; in the construction of their plots they were skilful rather than varied. In style, as well as to some extent in construction, Menander took Euripides as his model, infusing into his comedy an element of moral and sentimental reflection, which refined if it did not enliven it. Yet it may be doubted whether either a high moral or a high artistic purpose animated this school of writers, and whether Epicurus in Landor's dialogue does injustice to Menander in suspecting him of "enjoying the follies of men in our rotten state as flies enjoy fruit in its decay." Fate or chance were the directing powers of his dramatic actions.

New Comedy, and with it Greek comedy proper, is regarded as having come to an end with Posidippus (fl. c 280). Other comic writers of a later date are, however, mentioned, among them Rhodon of Tarentum (fl. c 260), whose mixed compositions have been called by various names, among them by that of phlyacography (from phlyax, useless chatter). But Greek comedy ceased to be productive after it had been transplanted from Athens to Alexandria; and though even in its original form it long continued to be acted in imperial Rome, the pieces of its history which may here be passed by.

The religious origin of the Attic drama impresses itself upon all its most peculiar features. Theatrical performances were held at Athens only at fixed seasons in the early part of the year—at the Bacchic festivals of the country Dionysia (vintage), the Lenaia (wine-press), probably at the Anthesteria, and above all, at the Great Dionysia, or the Dionysia par excellence, at the end of March and beginning of April, when in her most glorious age Athens was crowded with visitors from the islands and cities of her empire. As a part of the religious worship, the performances took place in a sacred locality—the Lenon or on the south-eastern declivity of the Acropolis, where the first wine-press (lenos) was said to have been set up, and where now an altar of Bacchus (thymi) formed the centre of the theatre. For the same reason, the elevation required the attendance of the spectators, and was therefore provided on a grand scale—according to the Platonic Socrates, for "more than 30,000" spectators. The performances lasted all day, or at least, in accordance with their festive character, extended to as great a length as possible. To their religious origin is likewise to be attributed the fact that they were treated as a matter of state concern. The expenses of the chorus, which in theory represented the people at large, were defrayed on behalf of the state by the liturgites (public services) of wealthy citizens, chosen in turn by the tribes to be choragi (leaders, i.e., providers of the chorus), the duty of training being, of course, deputed to the professional persons (chorodides). Publicly appointed and sworn judges decided between the merits of the dramas produced in competition with one another; the successful poet, performers, and choruses were crowned with ivy, and the last-named was allowed at his own expense to consecrate a tripod in memory of his victory, in the neighbourhood of the sacred Bacchic enclosure. Such a monument—one of the most graceful relics of ancient Athens—still stands in the place where it was erected, and recalls to posterity the victory of Lysicrates, achieved in the same year as that of Alexander on the Granicus. The dramatic exhibitions held at the number of religion and state, the dramaticus (theorikon) which had been introduced to prevent overcrowding, was from the time of Pericles provided out of the public treasury. The whole population had a right to its Bacchic holiday; neither women, nor boys, nor slaves were excluded from theatrical spectacles at Athens.

The religious character of the dramatic performances at Corinth; and the circumstances under which they accorded, and scenically took place, likewise determined their externals of costume and scenery. The actor's dress was originally the festive Dionysian attire, of which it always retained the gay and variegated hues. The use of the mask was due to the actor's appearing in the open air and at a distance from most of the spectators; its several species were elaborated with great care, and adapted to the different types of theatrical character. The cothurnus, or thick-soled boot, which further raised the height of the tragic actor (while the comedian wore a thin-soled boot), was likewise a relic of Bacchic costume. The scenery was, in the simplicity of its original conception, suited to open-air performances; but in course of time the art of scene-painting came to be highly cultivated, and movable scenes were contrived, together with machinery of the ambitious kind required by the Attic drama, whether for heightening gods down from heaven, or for raising mortals aloft.

On a stage and among surroundings thus conventional, Actors, it might seem as if little scope could have been left for the actor's art. But though the demands made upon the Attic actor differed in kind even from those made upon his Roman successor, and still more from those which the historic art has to meet in modern times, they were not the less rigorous. Mask and buskin might increase his stature, and the former might at once lend the appropriate expression to his appearance and the necessary resonance to his voice. But in declamation, dialogue, and lyrical passages, in gesticulation and movement, he had to avoid the least violation of the general harmony of the performance. At the same time, the refinements of by-play must, from the nature of the case, have been impossible on the Attic stage; the gesticulation must have been broad and massive; the actor must slow and the grouping hard in tragedy; and the recitation must have surpassed in its weighty sameness that half-chant of which the echoes have never wholly died out from the stage. Not more than three actors, as has been seen, appeared in any Attic tragedy. The actors were provided by the poet; perhaps the performer of the first parts (protagonists) was paid by the state. It was again a result of the religious origin of Attic dramatic performances, and of the public importance attached to them, that the actor's profession was held in high esteem. These artists were as a matter of course free Athenian citizens, often the dramatists themselves, and at times were employed in other branches of the public service. In later days, when tragedy had migrated to Alexandria, and when theatrical entertainments had spread over all the Hellenic world, the art of acting seemed to have reached an unprecedented height, and to have taken an extraordinary hold of the public mind. Synods or companies of Dionysian artists abounded, who were in possession of various privileges, and in one instance at least (at Pergamus) of rich endowments. The most important of these was the Ionian company, established first in Teos, and afterwards in Lebedos, near Colophon, which is said to have lasted longer than many a famous state. We likewise hear of strolling companies performing in partibus. Thus it came to pass that the vitality of some of the master-pieces of the Greek drama is without a parallel in theatrical history; while Greek actors were undoubtedly among the principal and most effective agents of the spread of literary culture through a great part of the known world.
touched the subject incidentally, Aristotle has in his *Poetics* (after 334) included an exposition of it, which, mutilated as it is, has formed the basis of all later systematic enquiries. The specialities of Greek tragic dramaticy refer above all to the chorus; its general laws are those of the regular drama of all times. The theories of Aristotle and other earlier writers were elaborated by the Alexandrians, many of whom doubtless combined examples with precept; they also devoted themselves to commentaries on the old masters, such as those in which Diodorus (c. 30 B.C.) abundantly excelled, and collected a vast amount of learning on dramatic composition in general, which was doomed to perish, with so many other treasures, in the flames kindled by religious fanaticism.

"The history of the Greek stage," says Sir Walter Scott, "is that of the dramatic art in general," and herein no doubt lies the broad distinction to be drawn between the drama of the Greeks and the isolated growths previously treated in this sketch. Yet though such is the case,—though in the Roman drama the native elements sink into insignificance when compared with those borrowed from the Greeks, and though the literary element in the modern drama of the West is directly or indirectly derived from the same source,—the Greek drama, both tragic and comic, had features of its own which it has been the principal aim of the foregoing brief account of it to mark. Tragedy never lost the traces of its religious origin, and the festive purposes of comedy are most signally apparent in precisely that period of its productivity whose works are least congenial to modern feeling and taste. But such is the wonderful power of the highest kind of art, that the tragedy of the three great masters, though its themes are so peculiar to itself that they have never been treated with the same effect by the numberless writers of other peoples who have essayed them, "hath ever been held the gravest, moralist, and most profitable of all other poems," and such is the commanding claim of genius, that Aristophanes, who cultivated a species of comedy of an altogether eccentric kind, occupies an eminence in his branch of the drama hardly more contestable than that of the great tragic trud in theirs. What is Homeric to us that we should weep for her,—or Antigones that our sympathy should accompany her on her holy errand, forbidden by human laws, but enjoined upon her by the behest of Zeus and of Justice dwelling with the gods below,—or Agamemnon that we should shrill with horror when his cries announce the wreaking of his doom? Why can we laugh at the ribald repartees of hide-seller and sausage-seller, careless of the merits of the former of these advanced politicians, and catch something of the dew of the rue-bringing maidens as it falls upon their beloved land, where the Etruscan joy greets the advent of spring? Because in all these instances, and in every other, the art of the Greek drama, while wrenched by the individual power of genius, is at the same time true to its purposes as an art, and in harmony with Nature, who will not teach her laws or surrender her secrets of a sudden or to all.

In its most productive age, as well as in the times of its decline and decay, the Roman drama exhibits the continued coexistence of native forms by the side of those imported from Greece—either kind being necessarily often subject to the influences of the other. Italy has ever been the native land of acting and of scenic representation; and though Roman dramatic literature is in the main but a faint reflex of Greek examples, yet there is perhaps no branch of Roman literary art more congenial than this to the soil wherein it sprang.

The beginnings of dramatic performances in Italy are to be sought in the rural festivities which doubtless from a very early period developed in lively intermixture the elements of the dance, of jocular and abusive improvisations in the native forms of song, speech, and dialogue, and of an assumption of character such as may be witnessed in any ordinary conversation among southern Italians at the present day. The occasions of these festivities were religious celebrations, public or private,—among the latter more especially weddings, which have in all ages been provocative of mirthful demonstrations. The so-called Festuccia verses (from festuccia, or from Festuccia in southern Etruria), which were afterwards confined to weddings, and ultimately gave rise to an elaborate species of artistic poetry, never married into actual dramatic performances. In the *satyrion*, on the Saturnalia, another—name originally due to the goatkins of the shepherds, but from primitive times connected with the *festival* of both performers and performance—there seems from the first to have been a dramatic element; they were probably comic songs or stories recited with gesticulation and flute accompaniment. Introduced into the city, these entertainments received a new impulse from the performances of the Etruscan players (tuscanes), who had been brought into Rome when scenic games (ludi reperi) were, in 364 B.C., for purposes of religious propitiation, first held there. These *tuscanes*, as they were called at Rome (*tusi istiones*), had been their native name, who have had the honour of transmitting their appellative to the entire *hispanica* art and its professors, were at first only dancers and pantomimists in a city where their speech was unintelligible. But their performances encouraged and developed those of other players and mountebanks, so that after the establishment of the regular drama at Rome on the model, the *saturion* came to be performed as farcical after-pieces (*exodos*), until they gave way to other species. Of these the *mimus* were at Rome probably coeval in their beginnings with the stage itself, where those who performed them were afterwards known under the same name, possibly in the place of an older appellation (*plantypides*, bare-footed). These loose farces, after being probably at first performed independently, were then played as after-pieces, tall in the imperial period, when they reasserted their predominance, they were again produced by themselves. At the close of the republican period the *mimus* had found its way into literature (through D. Laberius and others), and had been assimilated in both form and subjects to other varieties of the comic drama—preserving, however, as its distinctive mark, a preponderance of the name or gestual element. Together with the *pantomimus* (*v. infra*), the *mimus* continued to prevail in the days of the empire, having transferred its innate grossness (for it was originally a representation of *lesser life*) to its treatment of mythological subjects, with which it dealt in accordance with the demands of a "librerie and adulterae age." As a matter of course, the *mimus* freely borrowed from other species, among which, so far as they were of native Italian origin, the *Atellana* (from *Atella in Campania*) call for special mention. Usually supposed to be of Oriental birth, they originally consisted in delineations of the life of small towns, in which dramatic and other satire has never ceased to find a favourite butt. The principal personages in these living sketches gradually assumed a fixed and conventional character, which they retained even when, after the final overthrow of Campanian independence (210), the *Atellanae* had been transplanted to Rome. Here the heavy father or husband (*poppeus*), the ass-eared glutton (*macucus*), the full-cheeked, voracious chestnut-box (*nucocus*), and the wily sharper (*doresmus*) became accepted comic types, and with others of a similar kind were handed down, to reappear in the modern Italian drama. In these characters lay the essence of the *Atellanae*, their plots were extremely simple; the dialogue (perhaps interspersed with songs in Vili. — 52
Roman tragedy. only denved from aualogy, from scattered notices especially
Pnetexta. History
regular. the of Marius, or vigorous
mitted to the theatre was
have sanctioned the performance of plays deahng with the
CEdi pus, iterations of the
literary form, being written out at length by their authors
the species, it should have failed to
vengeance of a noble family (the
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become the means of emancipating the Roman serious
NreVlus
styles of the
metre) it was left to the performers to
at Rome thus had no opportunity for a
tragedy and
a
tragedy on the
Greek) origin; and its early history, at all
families,
tragedies belong to the Trojan cycle; and EuripIdes,
his favourite source and model. M. Pacuvius (b.
like Ennius subject from his youth up to the
influences of Greek civilization, and the first
Roman dramatist who devoted himself exclusively to the tragic
drama, was the least fertile of the chief Roman tragedians,
but was regarded by the ancients as indisputably superior to
Ennius. He again was generally (though not uniformly)
held to have been surpassed by L. Accius (b. 170),
a learned scholar and prolific dramatist, of whose plays 50
titles and a very large number of fragments have been
preserved. The plays of the three last-named poets maintained
themselves on the stage till the close of the republic;
and Accius was quoted by the emperor Tiberius.4 Of the other
tragic writers of the republic several were dilettanti—such
as the great orator and eminent politician C. Julius Strabo;
the cultivated officer Q. Tullius Cicero, who made an
attempt, disapproved by his illustrious brother, to introduce
the satyr-drama into the Roman theatre; L. Cornelius
Balbus, a Cassian partisan; and finally C. Julius Cesar himself.
Tragedy continued to be cultivated under the
earlier emperors; and of one author, the famous and ill-
feted L. Annesus Seneca
has come down to us. In accordance with the character
of their author's prose-work, they exhibit a strong
predominance of the rhetorical element, and a pomposity
of style far removed from that of the poets Sophocles and
Euripides, from whom Seneca derived his themes. The
metrification of his plays is very strict, and they were doubt-
less intended for recitation, whether or not also designed for
the stage. A few tragic poets are mentioned after Seneca,
but the reign of Domitian (81-96) the list becomes
finite. The close of Roman tragic literature is obscurer
than its beginning; and, while there are traces of tragic
performances at Rome as late as even the 6th century, we
are ignorant how long the works of the old masters
of Roman tragedy maintained themselves on the stage.
It would obviously be an error to draw from the plays of
character
tics of
Roman tragedy.

as posslble. The
Vigi.

1 Nervius, Lupus (The Wolf); Romulus; Ennius, Sibils (The
2 Nervius, Claudius (Marcellus); Ennius, Ambrosia; Pacuvius,
3 Paulus; Accius, Enneas (Decius!).
4 Balbus's Ier (The Messiah) a related play on an episode of the
Pharsalian campaign, seems to have been composed for the mere
private delocation of its author and hero. Octavia, a late
5 Gelo's remark to Seneca, was certainly not written by him.
4 "Oderunt dam nonnuntat" Atrevus.
Roman drama 411

In Roman comedy two different kinds—respectively called palliata and togata from the names of dress—were distinguished, the former treating Greek subjects and imitating Greek originals, the latter professing a native character. The palliata sought its originals especially in New Attic comedy, and its authors, as they advanced in refinement of style, became more and more dependent upon their models, and unwilling to gratify the coarser tastes of the public by local allusions or gross seasonings. But that kind of comedy which shrinks from the rude breath of popular applause usually has in the end to give way to its squeamish rivals, and thus, after the species had been cultivated for about a century (c. 250–150 B.C.), palliata ceased to be composed except for the amusement of small circles, though the works of the most successful authors, Plautus and Terence, kept the stage even after the establishment of the empire. Among the earlier writers of palliata were the tragic poets Andronicus, Naevius, and Ennius, but they were alike surpassed by T. Maccius Plautus (254–184), nearly all of whose comedies esteemed genuine by Varro—not less than 50 in number—have been preserved. He was exclusively a comic poet, and though he borrowed his plots from the Greeks—from Diphilus and Philemon apparently in preference to the more refined Menander—there was in him a genuinely national as well as a genuinely popular element. Of the extent of his originality it is impossible to judge; probably it lies in his elaboration of character and the concise details of his dialogue rather than in his plots. Modern comedy is indebted to him in all these points; and in consequence of this fact, as well as of the attention his text has for linguistic reasons received from scholarship both ancient and modern, his merits have met with their full share of recognition. Status Caecilius (an Insubrian brought to Rome as a captive c. 200) stands midway between Plautus and Terence, but no plays of his remain. P. Terentius Afor (c. 185–159) was, as his cognomen implies, a native of Carthage, of whose conqueror he enjoyed the patronage. His six extant comedies seem to be tolerably close renderings of their Greek originals, nearly all of which were plays of Menander. It was the good fortune of the works of Terence to be preserved in an exceptionally large number of MSS. in the monastic libraries of the Middle Ages, and thus (as will be seen) to become a main link between the ancient and the Christian drama. As a dramatist he is distinguished by correctness of style rather than by variety in his plots or vivacity in his characters; his chief merits—and at the same time the quality which has rendered him so suitable for modern imitation—is to be sought in the polite ease of his dialogue. In general, the characteristics of the palliata, which were divided into five acts, are those of the New Comedy of Athens, like which they had no chorus for purposes of explanation from author to audience the prologue sufficed; the Roman versions were probably terser than their originals, which they often altered by the process called contamination.

The togata, in the wider sense of the term, included all togata Roman plays of native origin—among the rest the protaseis in contradistinction to which and to the transient species of the trabeata (from the dress of the knights) the comedies dealing with the life of the lower classes were afterwards called tebaneris (from tebaneris, a shop), a name suited by some of their extant titles, while others point to the treatment of provincial scenes. The togata, which was necessarily more realistic than the palliata, and doubtless fresher as well as coarser in tone, flourished in Roman literature between 170 B.C. and 100 B.C. all whose plays bear Latin titles and were tebaneris, was succeeded by the more refined L. Afranius, who, though still choosing national subjects, seems to have treated them in the spirit of Menander. His plays continued to be performed under the emperors, though with an admixture of elements derived from that lower species, the pantomime, which they also were in the end to succumb. The Romans likewise adopted the burlesque kind of comedy called from its inventor Eukratoma, and by other names (cf. ante).

The end of Roman dramatic literature was dulcitantum Tha and critica, the end of the Roman drama was spectacle and show, buffoonery and sensual enjoyment. It was for this that the theatre had passed through all its early troubles, when the political partisanship of the old school had upheld the martial games of the circus against the enervating influence of the stage. In those days the guardians of Roman virtue had sought to diminish the attractions of the theatre by insisting upon its remaining as uncomfortable as possible, but as was usual at Rome, the privileges of the upper orders were at last extended to the population at large, though a separation of classes continued to be characteristic of a Roman audience. The next permanent theatre was erected at Rome by C. Pompeius (55 B.C.), which contained nearly 18,000 seats; but even of this the portion allotted to the performers (scena) was of wood, nor was it till the reign of Tiberius (22 A.D.) that, after being burnt down, the edifice was rebuilt in stone. See THEATRE.

Thought a species of amateur literary censorship, introduced by Pompeius, became customary in the Augustan age, in general the drama's laws at Rome were given by the dramatists' patrons—in other words, the production of plays was the occupation of private speculators who were contracted for with the officials charged with the superintendence of public amusements (curatores ludorum), the actors were slaves trained for the art, mostly natives of the South of Italy or Greece. Many of them rose to reputation and wealth, purchased their freedom, and themselves became directors of companies, though Sulla might make a knight of Roscius, and Cæsar and his friends defy ancient prejudice, the stigma of civil disability (infamia) continued to adhere to the profession. The actor's art was carried on at Rome under conditions differing in other respects from those of the Greek theatre. The Romans loved a full stage, and from the later period of the republic liked to see it crowded with supernumeraries. This accorded with their military instincts, and with the general gaiety of their tastes, which led them in the theatre as well as in the circus to delight in spectacle and tumult, and to applaud Pompeius when he furnished forth the return of Agamemnon in the Citraemnestra with a grand total of 600 heavily-laden mules. On the other hand, the actors were nearer to the spectators in the Roman theatre...
Roman ancient classical drama has been already foreshadowed. Pantomime—the art of gesticulation and movement only. In what respects tragedy and comedy, were now altogether conquered by oratory, and that art, by the influence of oratory, had become the nursing mother of the new birth of an art. Both these great actors are said to have been constant hearers of the great orator Clodius Gallus (d. c. 62 A.D.), who, like the great Roscius, excelled equally in tragedy and comedy, and his younger contemporary Clodius Aespous, a Greek by birth, likewise eminent in both branches of his art, though in tragedian more particularly. Both these great actors are said to have been constant hearers of the great orator Hortensius; and Roscius wrote a treatise on the relations between oratory and acting. In the influence of oratory upon the drama are perhaps to be sought the chief among the noble features of Roman tragedy to which a native origin may be fairly ascribed.

The ignoble end of the Roman—end with it of the ancient classical—drama has been already foreshadowed. The elements of dance and song, never individually united with the dialogue in Roman tragedy, were now altogether separated from it. While it became customary simply to recite tragedies to the small audiences who continued (or, as a matter of courtesy, affected) to appreciate them, the pantomimus commended itself to the heterogeneous multitude of the Roman theatre by confining the performance of the actor to gesticulation and dancing, a chorus singing the accompanying text. The species of drama, involved all its manifestations in a consistent condemnation; and when the faith of that church was acknowledged as the religion of the Roman empire, the doom of the theatre was sealed. This doom was not undeserved; for the remnants of the literary drama had long been overshadowed by entertainments such as both earlier and later Roman emperors—Domitian and Trajan as well as Galerius and Constantine—had found themselves obliged to prohibit. The drama towards the stage was in general as unavoidable as its particular expressions were at times heeded by fanaticism or distorted by ignorance. Had she not visited with her anathema a wilderness of decay, she could not herself have become—what she little dreamed of becoming—the nursing mother of the new birth of an art which seemed incapable of regeneration.

Though already in the 4th century actors and mountebanks had been excluded from the benefit of Christian sacraments, and excommunication had been extended to those who visited theatres instead of churches on Sundays and holidays, and though similar enactments had followed at later dates, yet the entertainments of the condemned profession had never been entirely suppressed, and had even occasionally received imperial patronage. Gradually, however, the mountebanks became a wandering fraternity, who doubtless appeared at festivals when they were wanted and vanished again into the deepest obscurity which has ever covered that mysterious existence—a stroller's life. It was thus that these strange intermediaries of civilization carried down such traditions as survived of the acting drama of pagan antiquity into the succeeding ages.

While the scattered and persecuted strollers thus kept alive something of the popularity, if not of the loftier traditions, of their art, neither, on the other hand, was there an utter absence of written compositions to bridge the gap between ancient and modern dramatic literature. In the midst of the condemnation with which the Christian church visited the stage, its professors, and votaries, we find individual ecclesiastics resorting in their writings to both the tragic and the comic form of the ancient drama. These isolated productions, which include (in the latter part of the 4th century) the Passion of Christ, usually attributed to St. Gregory Nazianzen, were doubtless mostly written for educational purposes, whether Eusebides and Lycophon, or Menander, Plautus, and Terence served as the outward models. The same was probably the design of the famous comedies of Hrosvitha, the Benedictine nun of Hrosvitha Ganderheim, in Eastphalian Saxony, which associate themselves in the history of Christian literature with the spiritual revival of the 10th century in the days of Otto the Great.

While awesomely imitated in form from the comedies of Terence, these religious exercises derive their themes—martyrdoms, and miraculous or otherwise startling conversions—

1 Callimachus, Part i.; Sepheria.
from the legends of Christian saints. Thus from perhaps the 9th to the 12th centuries Germany and France, and through the latter, by means of the Norman Conquest, England, became acquainted with what may be called the literary monastic drama. It was no doubt occasionally performed by the children under the care of monks or nuns, or by the religious themselves; an exhibition of the former kind was that of the Play of St. Katharine, acted at Dunstable about the year 1110 in “copes” by the scholars of the Norman Geoffrey, afterwards abbot of St Albans. Nothing is known of it except the fact of its performance, which was certainly not regarded as a novelty.

These forms of minstrelsy and mimesis, more and more popular, came to blend themselves with more popular forms of the early Christian drama. To what extent the minimes, or joculators (as in the early Middle Ages they came to be more generally called), kept alive the usage of entertainments more essentially dramatic than the monastic varieties of their performances, we cannot say; but we know that in Northern France they at a very early date appropriated the beginnings of the religious drama to secular uses. Doubtless in both Celtic and Teutonic populations there survived the remnants of religious rites containing dramatic elements, and the heathen festivals, of Roman or other origin, communicated something of their character to the Christian, at which the joculators were apt to appear. In different countries these entertainers united themselves to different tastes, and with the rise of native literatures to different literary tendencies. The literature of the troubadours of Provence, which communicated itself to Spain and Italy, came only into isolated contact with the beginnings of the religious dramas; in Northern France the jongleurs, as the joculators were now called, were confounded with the troubadours, who sang the chamou de gaste commemorative of deeds of war. As appointed servants of particular householders they were here and there, and afterwards in England, called minstrels or minstrels (from minstrelsy and mimesis). Such a histrion or mensa (as he is called) was Tulliefer, who rode first into the fight at Hastings, singing his songs of Roland and Charlemagne, and tossing his sword in the air and catching it again. In England such accomplished minstrels so far became the less versatile glee-men of pre-Norman times; while here as elsewhere the humbler members of the craft strolled from castle to convent, to other places, and even to the plays acted in the plays acted after the plays acted after the plays acted after the plays acted after the plays acted after the plays acted after the plays acted after the plays acted after the plays acted after the plays acted after the plays acted after the plays acted after the plays acted after the plays acted after the plays acted after the plays acted after the plays acted after the plays acted after the plays acted after the plays acted after the plays acted after the plays acted after the plays acted after the plays acted after the plays acted after the plays acted after the plays acted after the plays acted after the plays acted after the plays acted after the plays acted after the plays acted after the plays acted after the plays acted after the plays 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of the craftsmen of the acting profession. In France, where they had always preserved a secular side, they were introduced into courts and, with little initial resistance, found their way into the churches. In the 13th and 14th centuries, they were performed in several ways. The religious dramas of the Troubadours, which were popular throughout Europe, were adapted to the liturgical calendar and performed in churches. The Passion tales were performed in the streets during the Passion Week, and the Easter Passion plays were performed in the open air. The Christmas Passion plays were performed in the churches, and the Shrove-Tuesday plays were performed in the streets.

1 Such a piece was the Sinfonia e Serpente (1486), by Lorenzo de' Medici, who afterwards sought to reform the Italian stage by pursuing it.
the individual plays in these collections were doubtless founded on French originals; others are taken direct from Scripture, from the apocryphal gospels, or from the legends of the saints. Their characteristic feature is the combination of a whole series of plays into one collective whole, exhibiting the entire course of Bible history from the creation to the day of judgment. For this combination it is unnecessary to suppose that they were generally indebted to foreign examples, though there are several remarkable coincidences between the Chester plays and the French M&étre du Veil Testament.

The manner of these plays,” we read in a description of those at Chester, dating from the reign of Henry VII. Every company had its pageant, which pageants were a high scaffold with two rooms, a higher and a lower, upon four wheels. In the lower they appalred themselves, and in the higher room they played, being all open at the top, that all beholders might hear and see them. The places where they played was in every street. They began first at the alleys gate, and when the first pageant was played, it was wheeled to the high cross before the mayor, and so to the market, that corresponded to the pageant playing before them at one time until all the pageants appointed for the day were played, and when one pageant was near ended, word was brought from street to street, that the next might come in place thereof, exceedingly orderly, and all the streets have their pageants afore them all at one time playing together, to see which plays was great respect, and also a flattery and stage made in the streets in those places where they determined to play their pageants, etc.

Each play, then, was performed by the representative of a particular trade or company, after whom it is called the fishers' golvers', etc., pageant, while a general prologue was spoken by a herald. As a rule the movable stage sufficed for the action, though we find horsemanship riding up to the scaffold, and Herod instructed to “rage in the pagond and in the street also.” There is no probability that the stage was, as in France, divided into three platforms with a dark cavern at the side of the lowest, appropriated respectively to the Heavenly Father and His angels, to saints and glorified men, to mere men, and to souls in hell. But the last-named locality was frequently displayed in the English miracles, with or without fire in its mouth. The costumes were in part conventional,—divine and saintly personages being distinguished by gilt hair and beards, Herod being clad as a Saracen, the demons wearing hideous heads, the souls black and white coats according to their kind, and the angels gold skins and wings.

Doubleless these performances abounded in what seem to us ludicrous features, and though their main purpose was serious, they were not in England altogether devoid of fun. But many of these features are in truth only homely and woful, and the simplicity of feeling they exhibit are times not without its pathos. The occasional excessive grossness is due to an absence of refinement of taste rather than to an obliquity of moral sentiment. In this, as in other respects, the Coventry Plays, which were possibly written by clerical hands, show an advance upon the others. In the same plays is already to be observed an element of abstract figures, which connect them with a different species of the medieval drama.

Morality plays corresponded to the love for moral morality which manifests itself in so many periods of our literature, and which, while dominating the whole field of medieval literature, was nowhere more assiduously and effectively cultivated than in England. It is necessary to bear this in mind in order to understand what it means to us seems so strange, the popularity of the moral-plays, which indeed never equaled that of the miracles, but sufficed to maintain the former species till it received a fresh impulse from the connection established between it and the “new learning,” through the new political and religious ideas and questions, of the Reformaion age. Moreover, a specially popular element was supplied to these plays, which

in manner of representation differed in no essential point from the Devil from the muses, in a character borrowed from the latter, and, in the moralities, usually provided with a companion whose task it was to lighten the weight of such abstractions as Sapience and Justice. These were the Devil and his attendant the Vice, of whom the latter seems to have been of native origin, as he was usually dressed in a fool’s habit, was probably suggested by the familiar custom of keeping an attendant fool at court or in great houses. The Vice had many names (Stiffy, Ambadaster, Sin, Fraud, Ignorant), etc., but his usual duty was to torment and tease the Devil his master for the elucidation and diversion of the audience. He was gradually blended with the domestic fool, who survived in the regular drama.

The earlier English moralities1—from the reign of Henry Groups or VI. to that of Henry VII—usually allegorize the contrasts between good and evil in the mind and life of man, without any side-intention of theological controversy, such as is still essentially the purpose of the morality we possess by Henry VIII’s poet, the witty Skelton,2 even of another, perhaps the most perfect example of its class, which in date is already later than the Reformation. But if such a theory as Every-Man teaches the orthodox doctrine of Rome, its successor, R. WEVER'S Lusty*Jovwntus, breathes the spirit of the dogmatic reformation of the reign of Edward VI.

Theological controversy largely occupies the moralities of the earlier part of Elizabeth’s reign, and connects itself with political feeling in a famous morality,3 Sir DAVID Lyndsey’s Nature of the Three Estates, written on the other side of the border, where such efforts as the religious drama proper had made had been extinguished by the Reformation. Only a single English political morality proper remains to us, which belongs to the beginning of the reign of Elizabeth.4 Yet another series connects itself with the ideas of the Renaissance rather than the Reformation, treating of intellectual progress rather than of moral conduct,5 this extends from the reign of Henry VIII. to that of his younger daughter.

The transition from the morality to the regular drama in England was effected on the one hand by the intermixture of historical personages with abstractions—as in Bishop TALON’S Knyg Johan (1558), which was based upon the regular Chronicle History,—on the other by the introduction of types of real life by the side of abstract figures. This latter tendency, of which instances occur in earlier plays, is observable in several of the 16th century moralities,6 but the most influential of all, a further instance which had been taken by a man of genius, John Heywood (d. 1555), whose sinneres were short farces in the French manner, dealing entirely with real—very real—men and women. Orthodox and conservative, he had at the same time a keen eye for the vices as well as the foibles of his age, and not the least for those of the clerical profession. Other writers, such as T. Ingeland,7 took the same direction, and the allegory of abstractions was thus undermined on the stage, very much as in didactic literature the ground had been cut out from under its feet by the Ship of Fools. Thus the sinneres—a name which had been used for the moralities themselves from an early date—facilitated the advent of comedy, without having superseded the earlier form. Both moralities and miracle-plays survived into the Elizabethan age, after the regular drama had already begun its course.

1 The Castle of Perseverance, Medwall, Nature; The World and the Child, Hidehe-Somner, etc. 2 The Life and Death of the Honest Man.

2 The New Estowme, N. Woodus, The Conflict of Conscience, etc.

3 A Little Gw Wright

4 The Three hinges, etc.

5 The Marriage of Wit and Wisdom.

6 Jack Jupiter; Tom Titler and his Wife, etc.

7 The Four Ys, etc.

8 The Four Footes, etc.
Drama

The Renaissance and the national drama.

The priority in this as in most of the other aspects of the Renaissance belongs to Italy. In ultimate achievement, the Italian drama fell short of the fulness of the results obtained elsewhere—a surprising fact when it is considered, not only that the Italian language had the vantage-ground of closest relationship to the Latin, but that the genius of the Italian people has at all times inspired it with a predilection for the drama. The cause is doubtless to be sought in the absence from Italian national life during a long period, and more especially during that contemporarily with the rise and earlier promise of Italian dramatic literature, of those loftiest and most potent impulses of popular feeling to which a national drama owes so much of its strength. This absence was due partly to the peculiarities of the Italian character, partly to the political and ecclesiastical experiences Italy was fated to undergo. The Italians were strangers to the enthusiasm of patriotism, which was as the breath in the nostrils of our Elizabethan age, as well as to the single-mindedness of Spain with which the Catholic Revival a civilization like those of Italy has ever experienced, did the rest, and for many generations rendered impotent the higher efforts of the dramatic art. No basis was permanently found for a really national tragedy; while the light comedy, after turning from the direct imitation of Latin models to a more popular form, lost tragedy in an abandoned immorality of tone and in reckless insolence of invective against particular classes of society. Though its productivity long continued, the poetic drama more and more concentrated its efforts upon subordinate or subsidiary species, artificial in origin and decorative in purpose, and surrendered its substance to the overpowering aids of music, dancing, and spectacle. Only a single form of the Italian drama, the improvised comedy, remained truly national; and this was of its nature dissociated from higher literary effort. The revival of Italian tragedy in later times is due partly to the imitation of French models, partly to the endeavour of a brilliant genius to infuse into his art the historical and political spirit. Comedy likewise attained to new growths of considerable significance, when it was sought to accommodate its popular forms to the representation of real life in a wider range, and again to render it more poetical in accordance with the tendencies of modern romanticism.

The regular Italian drama, in both its tragic and its comic branches, began with a reproduction, in the Latin language of classical models; but tragedy in its beginnings showed a tendency which it was before long to treat themes of national historical interest. Two examples, which we hear, written by the Paduan historian Miasato about 1300, were both copies of Seneca, but while the one (Achilles) treated a classical theme, the other dealt with the history of a famous tyrant of the author's native city (Eccenas). In the next century events of recent or contemporary history were similarly dealt with; but the majority of its Latin dramas were doubtless written to suit the tastes of the friends and patrons of the Italian Renaissance, who, like Lorenzo the Magnificent, wished to domesticate the heathen gods and goddesses on a stage hitherto occupied by the revered figures of Christian belief. Such were the Latin imitations and translations of Greek and Latin tragedies and comedies by Bishop Martirano, the friend of Lorenzo's son Leo X., on the adventure of Danae, and other subjects; the famous Progne of G. Corrado (c. 1644), the nephew of an earlier Pope; and the efforts of Pomponius Lestus, who, with the aid of Cardinal Riauro, sought to revive the ancient theatre, especially that of Plistus and Terence, at Rome. Many Latin comedies are mentioned from the 15th century, during which, as during its predecessor, Latin continued the dominant language of the stage in Italy. Nor was the representation even of Greek plays altogether unknown; it was by her performance of the Electra of Sophocles that Alexandra Scala caused Politian to envy Orestes.

Early in the 16th century, tragedy began to be written in Italian in the native tongue; but it retained from the first, and never wholly lost, the impress of its origin. Whatever the source of its subjects—which, though mostly of classical origin, were occasionally derived from native romance, or even due to invention—they were all treated with a pre-dilection for the horrible, inspired by the example of Seneca, though no doubt encouraged by a perennial national taste. The chorus, stationary on the stage as in old Roman Latins, De Capitale Deuca Jacob (Jacopo Principane, d. 1664) Fragmata, Vernaculo, Ferdinandez et alia (Aragon) Servitaes, Historia Batica (cession of the Moors from Granada).

1 Lazhvit, De Capitale Deuca Jacob (Jacopo Principane, d. 1664)
2 Fabwid, Venetac, Ferdinandez (of Aragon) Servitaes, Historia Batica (cession of the Moors from Granada).
tragedy, was not reduced to a merely occasional appearance between the acts till the beginning of the 17th century, or ousted altogether from the tragic drama till the earlier half of the 18th. Thus the changes undergone by Italian tragedy were for a long series of generations chiefly confined to the form of versification and the choice of themes, nor was it, at all events till the last century of the course it has hitherto run, more than the after-growth of an after-growth. The honour of having been the earliest tragedy in Italian seems to belong to Galeotto's Soffonabia (1502), a piece in 15 or 20 acts, regardless of unity of scene. A da Pistoia's Pamfìlia (1508) followed, of which the subject was taken from Boccaccio, though the names of the characters were Greek. The play usually associated with the beginning of Italian tragedy—that with which "th' Italian scene first learned to glow"—was another Soffonabia, acted before Leo X. in 1515, and written in blank verse (verso sciolto) instead of the ottava and terza rima of the earlier tragedians (retaining, however, the lyric measures of the chorus), by Traverso, who was employed as nunco by that Pope. Other tragedies of the former half of the 16th century were the Rosmunda of Racchioli, a nephew of Lorenzo the Magnificent (1516); Alamanno's Antigone (1532); the Canace of Sperone Sperone, the famous Muspo of Tusso, who, like Tasso's elaborate style for his model, the Orfeo, the earliest dramatic treatment of this famous subject, of the notorious Aretino (1549); and the nine tragedies of G. Cintio, among which L'Orbene (1541) is accounted the best and the bloodiest. Guittone, the author of those Heautontimoruma to which Shakespeare was indebted for so many of his subjects, was (supposing him to have invented these) the first Italian who was the author of the fables of his own dramas; he introduced some novelties into dramatic construction, separating the prologue and probably also the epilogue from the action, and has by some been regarded as the inventor of the pastoral drama. In the latter half of the 16th century may be mentioned the Dolone and the Manniana of L. Dolce, the translator of Seneca (1563); the Hydriama (acted before 1561 or 1568) of L. Grotto, which treats the story of Romeo and Juliet, Tasso's Torrimento (1587), the Tancredi of Asnara (1598); and the Meropo of Torelli (1593), the last who employed the stationary chorus (coro fisso) on the Italian stage. Leonico's Soldato (1550) is noticeable as supposed to have given rise to the modern coda"coda", or domestic tragedy, of which there are few examples in the Italian drama, and De Velo's Tamar (1556), as written in prose. Subjects of modern historical interest were in this period treated only in isolated instances 1.

The tragedians of the 17th century continued to pursue the beaten track, at times in vain, seeking by the introduction of musical airs to compromise with the danger with which their art was threatened of being (in Voltaire's phrase) extinguished by the beautiful monster, the opera, now rapidly gaining ground in the country of its origin. (See Opera.) To Count P. Bonarelli (1593-1599), the author of Soldano, is on the other hand ascribed the first uses of the chorus in Italian tragedy. The innovation of the use of rhythm attempted in the learned Pallavicino's Erminigildi (1533), and defended by him in a discourse prefixed to the play, was in Italy no more than in England able to achieve a permanent success; its chief representative was afterwards Martelli (d. 1577), whose rhymed Alexandrine verse (Martellano), though on one occasion used in comedy by Goldoni, failed to command itself to the popular taste. By the end of the 17th century Italian tragedy seemed destined to expire, and the great tragic actor Cotta had withdrawn in disgust at the apathy of the public towards the higher forms of the drama. The 18th century was, however, to witness a change, the beginning of which are attributed to the institution of the Academy of the Arcadui at Rome (1630). The principal efforts of the new school of writers and critics were directed to the abolition of the chorus, and to a general increase of freedom in treatment. Before long the Marquis S. Maffeis Mistri, with his Meropi (first printed 1713) achieved one of the most brilliant successes recorded in the history of dramatic literature. This play, which is devoid of any love-story, long continued to be considered the master-piece of Italian tragedy, Voltaire, who declared it "worthy of the most glorious days of Athens," adapted it for the French stage, and it inspired a celebrated production of the English drama. 2 It was followed by a tragedy full of horrors, noticeable as having given rise to the first Italian dramatic parody, and by the highly esteemed productions of Graselli (d. 1769) and his contemporary Bettinelli. The influence of Voltaire had now come to predominate over the Italian drama, and, in accordance with the spirit of the times, greater freedom prevailed in the choice of tragic themes. Thus the greatest of Italian tragic poets, Count V. Alfieri (1749-1803), founded his path prepared by him. Alfieri's grand and impassioned treatment of his subjects caused his faults of form, which he never altogether overcome, to be forgotten. The spirit of a love of freedom which his creations 3 breathed was the herald of the national ideas of the future. Spurning the usages of French tragedy, his plays, which abound in soliloquies, owe part of their effect to an impassioned force of declamation, part to the "poésie" by which Italian acting seems pre-eminent capable of thrilling an audience. He has much besides the subjects of two of his dramas 4—in common with Schiller, but his amanzo-muse (as Schlegel called her) was not schooled into serenity, like the muse of the German poet. Among his numerous plays (21), Meropi and Saul, and perhaps Mirra, are accounted his master-pieces. The political colouring given by Alfieri to Italian tragedy reappears in the plays of U. Posolo (c. 1750-1827) and A. Manzoni (1784-1873), both of whom are under the influence of the romantic school of modern literature; and to these names must be added those of S. Pellico (1789-1854) and G. B. Niccolini (1785-1861), whose most esteemed dramas 5 treat national themes familiar to all students of modern history and literature. While Italian tragedy has upon the whole adhered to its love of strong situations and passionate declamation, its later growths have shown a capability of development precluding the supposition that its history is closed. The art of tragic acting at the present day probably stands higher in Italy than in any other European country, if the tragic muse were to be depicted with the features of a living artist, it is those of Adelaide Ristori which she would assume. In comedy, the efforts of the scholars of the Italian Renaissance for a time went wide of the mark, by the progress of popular entertainments noticed above. While the contrasts of the close of the 15th and of the 16th century were disputations between pairs of abstract or allegorical figures, in the frotteola human types take the place of abstractions, and more than two characters appear. To the farce (a name used of a wide variety of entertainments) a new literary and as well as social significance was given by the Neapolitan court-poet Sanmarano (c. 1492), about the same time as a capitanio valoroso," Venturino of Pesaro, first brought on the modern stage the capitanio glorioso o spavento, the

1 Mondino, Ifigia (1582), Falegna, Tragedino (1589).

2 Roma, Dampiscia.

3 Lazzareschi, Ulisse di Giovenna (1719)

4 E. G. Bruno I and II.


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military braggart who owed his origin both to Plautus and to the Spanish officers who abounded in the Italian cities of those days. The popular character-comedy, a relic of the ancient Attic drama, likewise took a new lease of life—and this in a double form. The improvised comedy (commedia a soggetto) was now as a rule performed by professional actors, members of a craft, and was thence called the commedia dell’arte, which is said to have been invented by Francesco (called Terenzo) Chera, the favorite player of Leo X. Its scenes, still unwritten except in skeleton (scenario), were connected together by the ligatures or links (lazzu) of the arteluchino, the descendant of the ancient Roman annio (whence our skizzz). Harlequin’s summit of glory was probably reached early in the 17th century, when he was ennobled in the person of Cecchino by the Emperor Matthias, of Cecchino’s successors Zaccagnino and Truffaldino, we read that “they shut the door in Italy to good harlequin.” Distinct from this growth is that of the masked comedy, the action of which was chiefly carried on by certain typical figures in masks, speaking in local dialects, but which was not improvised, and indeed from this time on to the time when that had been done. The inventor was A. Beolco of Padua, who called himself Ruzzante (joker), and who published six comedies in various dialects, including the Greek of the day (1530).

This was the masked comedy to which the Italians so tenaciously clung, and in which, as all their own and imitative by no other nation, they took such a great pride that even Goldoni was unable to overthrow it.

Meanwhile the Latin imitations of Roman, varied by occasional translations of Greek, comedies early led to the production of Italian translations, several of which were performed at Ferrara in the 15th century, and before its close to the composition of what is regarded as the first original Italian comedy—in other words, as the first of the modern drama. But the claim to this honour of Boiardo’s Timone (before 1494) is doubtful—not in time, but because that play is only in part original, being founded upon, and in a great measure taken from, a dialogue of Lucian’s; since moreover its personages are abstractions, it represents at most the translation from the moralities. The first Italian comedy in verse, Ricci’s I Tre Tiranni (before 1530), is likewise a morality, and Trissino’s comedy, which followed, a mere adaptation of the Menachmi of Plautus. About this time, however, the commedia erudita, or scholarly comedy, began to be cultivated by a succession of eminent writers, among whom the titles of the father of modern comedy, if it belongs to any man, belongs to Ariosto (1474–1533). His comedies (though the first two were originally written in prose) are in blank verse, to which he gave a singular mobility by the dactylic ending of the line (avverso). Ariosto’s models were the masterpieces of the calidora, and his morals those of his age, which equalled those of the worst days of ancient Rome or Byzantium in looseness, and surpassed them in effrontery. He chose his subjects accordingly; but his dramatic genius displayed itself in the effective drawing of character, and especially in the skilful management of complicated intrigues. Such, with an additional brilliancy of wit and lasciviousness of tone, are likewise the characteristics of Machiavello’s (1469–1527) famous prose comedy, the Mandragola (The Magic Draught), and, in their chimeras, of the plays of A. Araldo (1492–1557), especially the prose Mandragola, whose name, it has been said, ought to be written in asterisks. Other comedians of the 16th century were R. Accolti, whose Virginia (prob. before 1513) treats the story from Boccaccio which reappears in Alt’s Well that Ends Well; G. B. Araldo and J. Nardi, noteworthy as decent and moral in tone and tendency; G. Cocchi, F. D’Ambra, A. F. Grazzini, N. Secco or Scoci, and L. Dolce—all writers of romantic comedy of intrigue in verse or prose.

During the same century the pastoral drama flourished in Italy. The origin of this peculiar species—which was pastoral drama.

In Italy. The origin of this peculiar species—which was already known in the bucolic idyll in a dramatic form, and which freely lends itself to the pastoral idyll in a double form. The pastoral drama is the present of the opera—this beautiful work tells its story simply. N. da Correggio’s (1450–1508) Cefalo, or Aurora, and others followed, before in 1554 A. Becchi produced, as totally new of its kind, his Arcadian pastoral drama Il Soggetto, in which the comic element predominates. But an epoch in the history of the species is marked by the Aminta of Tasso (1573), in whose Arcadia is allegorically mirrored the Ferrara court. Adorned by choral lyrics of great beauty, it presents an allegorical treatment of a social and moral problem; and since the conception of the characters, all of whom think and speak of nothing but love, is artificial, the charm of the poem lies not in the interest of its action, but in the passion and sweetness of its sentiment. This work was the model of many others, and the pastoral drama reached its height of popularity in the famous Pastor Fido (written before 1590) of B. Guarini, which, while founded on a tragic love-story, introduces into its complicated plot a comic element, partly with a satirical intention. Thus, both in Italian and in other literatures, the pastoral drama became a distinct species, characterised like the great body of modern pastoral poetry in general by a tendency either towards the artificial or towards the burlesque. Its artificiality affected the entire growth of Italian comedy, including the commedia dell’arte, and impressed itself in an intensified form upon the opera. (See Opera.) The foremost Italian masters of the last-named species, so far as it can claim to be included in the poetic drama, were A. Zeno (1668–1750) and F. Metastasio (1699–1782).

The comic dramatists of the 17th century are grouped Comedy in as followers of the classical and of the romantic school, the 17th (called a commedia cinese in verse, the other two, free century, and 18th adaptations from Plautus and Terence, are in prose.}

1 Pyrgopolonies in the Miles Gloriosus.
2 The masked characters, each of which spoke the dialect of the place he represented, were (according to Barchi) Pandolfo, a Venetian merchant; Dottore, a Florentine physician; Spampento, a Neapolitan braggadocio; Pirolammetta, a wag of Apulia; Gianniparolo and Cornello, clowns of Calabria; Golfofaro, a Roman bear; Braccellata, a Ferrarese piper; Aretino, a blundering servant of Bergamo. Besides these and a few other such personages (of whom four at least appeared in each play), there were the Amoroso or Amoresoratus, men or women, and latter not before 1546, up to which time actresses (unknown in Italy) with serious parts, and Smalaldina, Colombina, Spinetta, and other servis or waiting-maidens. All these spoke Latin, and were no masks.
3 Boiardo died in 1494, in or after which year Nardini’s Amica was written; while Dorico’s (afterwards Cardinal of Bologna) is dateless but not comic, comedy, which precedes that not taken from Plautus, is thought to have been composed not long before its representation in 1508.
tion of Spanish examples. Italian comedy had fallen into decay, when its reform was undertaken by the wonderful theatrical genius of C. Goldoni (1707-1793). One of the most fertile and rapid of playwrights (of his 150 comedies 16 were written and acted in a single year), he at the same time pursued definite aims as a dramatist. Disgusted with the conventional buffoonery, and ashamed of the rampant immorality, of the Italian comic stage, he drew his characters from real life, whether of his native city (Venice) or of society at large, and sought to enforce virtuous and pathetic sentiments without neglecting the essential objects of his art. Happy and various in his choice of themes, he produced, besides comedies of general human character, plays on subjects drawn from literary biography or from fiction. Goldoni, whose style was considered defective by the purists whom Italy has at no time lacked, met with a severe critic and a temporarily successful rival in Count C. Gozzi (1722-1806), who sought to rescue the comic drama from its association with the real life of the middle classes, and to infuse a new spirit into the figures of the old masked comedy by the invention of a new species. His themes were taken from Neapolitan and Oriental* fairy tales, to which he accommodated some of the standing figures upon which Goldoni had made war. The attempt at mingling fancy and humour—occasionally of a directly satirical turn—was in harmony with the tendencies of the modern romantic school, and Gozzi’s efforts, which though successful found hardly any imitators in Italy, have a family resemblance to those of Tieck.

During the latter part of the 18th and the early years of the present century comedy continued to follow the course marked out by its acknowledged master-dramatist, under the influence of the sentimental drama of France and other countries. Villi, Nelli, the Marquis Albergati Capaccili, Sografi, Federici, and Signorelli (the historian of the drama) are mentioned among the writers of the school; to the present century belong Count Girardi, Marchiato (who took his subjects especially from commercial life), and Nata, a fertile writer, among whose plays are three treating the lives of poets. Of still more recent date are Bon and Brofferio. Though no recent Italian comedies have acquired so wide a celebrity as that which has been obtained by the successful productions of the recent French stage, there seems no reason to predict a barren future for Italian comedy any more than for Italian tragedy. Both the one and the other have survived periods of a seemingly hopeless decline, tragedy has been rescued from the pedantry of a timid classicism, comedy from the vileness of its most popular but least progressive form; and neither the opera nor the drama has succeeded in ousting from the national stage the legitimate forms of the national drama.

To the above summary of the history of the modern Italian drama it would not have been inappropriate to append a brief account of that of the modern Greek drama. The dramatic literature of the later Hellenes is a creation of the literary movement which preceded their glorious struggle for independence, or which may be said to form part of that struggle. After beginning with dramatic dialogues of a patriotic tendency, it took a step in advance with the tragedies of J. R. Nerulos (1778-1850), whose name belongs to the political as well as to the literary history of his country. His comedies—especially one directed against the excesses of journalism—largely contributed to open a literary life for the modern Greek tongue. Among the earlier patriotic Greek dramatists of the present century are T. Alkane, J. Zampelos (whose tragic style was influenced by that of Alfieri),6 S. K. Karydas, and A. Vaiocritas. A. Zoros10 is noteworthy as having introduced the use of prose into Greek tragedy, while preserving to it that association with sentiments and aspirations which will probably long continue to pervade the chief productions of modern Greek literature. The love of the theatre is ineradicable from Attic as it is from Italian soil, and the tendencies of the young dramatic literature of Hellas seem to justify the hope that a worthy future awaits it.

Italy produced many brilliant growths, from which the Spanish dramatic literature of other nations largely borrows.

Spain is the only country of modern Europe which shares with England the honour of having achieved, at a relatively early date, the creation of a genuinely national form of the regular drama. So proper to Spain was the form of the drama which she produced and perfected, that to it the term romantic has been specifically applied, though so restricted a use of the epithet is clearly unjustifiable. The influences which from the Romance peoples—in whom Christian and Germanic elements mingled with the legacy of Iberian law, learning, and culture—spread to the Germanic nations were represented with the most signal force and fullness in the institutions of chivalry—to which, in the words of Scott, “it was peculiar to blend military valour with the strongest passions which actuate the human mind, the feelings of devotion and those of love.” These feelings, in their combined operation upon the national character, and in their reflection in the national literature, were not peculiar to Spain; but nowhere did they so long or so late continue to animate the moral life of a nation. Outward causes contributed to this result. For centuries after the crusades had become a mere memory, Spain was a battle-ground between the cross and the crescent. And it was precisely at the time when the Renaissance was establishing new starting-points for the literary progress of Europe, that Christian Spain rose to the height of Catholic as well as national self-consciousness, and the conquest of the New World. From their rulers or rivals of so many centuries the Spaniards had derived that rich glow of colour which became permanently distinctive of their national life, and more especially of its literary and artistic expressions; they had also perhaps derived from the same source an equally characteristic refinement in their treatment of the passion of love. The ideas of Spanish chivalry—more especially religious devotion and a pungent sense of personal honour—asserted themselves (according to a process often observable in the history of civilization) with peculiar distinctness in literature and art, after the great achievements to which they had contributed in other fields had already been wrought. The repeated glories of the Spanish drama belong to an age of national decay—mindful, it is true, of the ideas of a greater past. The chivalrous enthusiasm, perhaps so many of the master-pieces of its literature is indeed a characteristic of

1 Mercola Cortese (Jerome the Accomplished Man), La Bologna del Lusitano, k.c.
2 La Vedova Scovola (The Cunning Widow), La Pulita Ovovata (The Respectful Cow); La Buona Fritta, La B Spesa; La B. Furtiva; La B. Magiata (the last of which was unsuccessful), “goodness, says Goldoni, ‘never disappears, but the public weary of every- thing,” k.c., and Il Barbero Benigno called in its original French version Le Buteur Beneficat.

3 Moliera; Terenzio, Tasso.
4 Pamela; Pamela Marsiata; Il Paesano Folle (Mr-Spectator).
5 Il Amore delle tre Marrane (The Three Lambs); Il Corvo.
6 Tourandot; Zelote.
7 L’Amore delle tre M. (against Goldoni); L’Angelo Belvedere (The Small Green Bird) (against Hevelius, Bembo, and Vellotti).
8 Alcina, Poligna.
9 Ephemeridographos.
10 Onofrio, Emantiana Palopoli, 4 Kipos of Pierre.
11 The Three Hundred, or The Character of the Ancient Helles (Lusinian); The Death of the Oedipus (Drammatiche); A Scene of Pyramus, &c.
the Spanish nation in all, even in the least hopeful, periods of its later history; and the religious ardour breathed by the
Spanish people in the glorious days of Ferdinand and Isabella;
and it is not in the beginnings but in the great age of
Spanish dramatic literature that there is often most difficulty
in distinguishing between what is to be termed a religious and
what a secular play. After Spain had thus, the first after
England among modern European countries, fully unfolded
that incomparably richest expression of national life and sentiment
in an artistic form—a truly national dramatic literature,—the terrible decay of her greatness and prosperity gradually impaired the strength of a brilliant but, of
its nature, dependent growth. In the absence of high
original genius the Spanish dramatists began to turn to
foreign models, though little supported in such attempts by
popular sympathy; and it is only in more recent times that
the Spanish drama has sought to reproduce the ancient
forms from whose master-pieces the nation had never become estranged, while accommodating them to tastes and
tendencies shared by later Spanish literature with that of
Europe at large.

The earlier dramatic efforts of Spanish literature may
without inconvenience be briefly dismissed. The reputed
author of the Couplets of Mingo Bevulgo (Il Cota the
eldest) likewise composed the first act of a story of intrigue
and character, purely dramatic but not intended for representa­tion. This tragic comedy of Calcado and Molina,
which was completed (in 21 acts) by 1499, afterwards
became famous under the name of Celestina; it was frequently imitated and translated, and was adapted for the
Spanish stage by R. de Zepeda in 1582. But the father of the
Spanish drama was...
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fertility, which was such that he wrote about 1500 plays, besides 300 dramatic works classed as *autos sacramentales* and *entremeses*, and a vast series of other literary compositions, has indisputably prejudiced his reputation with those to whom he is but a name and a number. Yet as a dramatist Lope more fully exemplifies the capabilities of the Spanish theatre than any of his successors, though as a poet Calderón may deserve the palm. Nor would it be possible to imagine a truer representative of the Spain of his age than a poet who, after suffering the hardships of poverty and exile, and the pangs of passion, sailed against the foes of the faith in the Invincible Armada, subsequently became a member of the Holy Inquisition and of the Order of St Francis, and after having been decorated by the Pope with the cross of Malta and a theological doctorate, honored by the nobility, and idolized by the nation, ended with the names of Jesus and Mary on his lips. From the plays of such a writer we may best learn the manners and the sentiments, the ideas of religion and honour, of the Spain of the Philippine age, the age when she was most prominent in the eyes of Europe and most glorious in her own. For, with all its inventiveness and vigor, the genius of Lope primarily set itself the task of pleasing its public,—the very spirit of whose inner as well as outer life is accordingly mirrored in his dramatic works. In them, we have, in the words of Lope's French translator Baret, "the movement, the elegance, the conflict of unforeseen intrigues suitable to unreckoning spectators, perpetual forteresses addressed to an unextinguishable national pride; the painting of passions dear to a people never tired of admiring itself; the absolute sway of the point of honor, the dedication of revenge; the adoration of symbols, buffoonery and burlesque, everywhere beloved of the multitude, but here never defied by obstinacy, for this people has a sense of delicacy, and the foundation of its character is nobility; lastly, the flow of proverbs which at times escape from the grácioso (the comic servant domesticated in the Spanish drama by Lope)—'the commonplace literature of those who possess no other.'"

The plays of Lope, and those of the national Spanish drama in general, are divided into classes which it is naturally not always easy, and which there is no reason to suppose him always to have intended, to keep distinct from one another. After his early youth composing elogies, pastoral plays, and allegorical moralities in the old style, he began his theatrical activity at Madrid about 1550, and the plays which he thenceforth produced have been distributed under the following heads. The Lopean *autos de capa y espada*—not comedies proper, but dramas, the principal personages in which are taken from the classes of society which wears cloak and sword. Gallantry is their main theme, an interesting and complicated, but well-constructed and perspicuous intrigue their chief feature; and this is usually accompanied by an underplot in which the grácioso plays his part. Their titles are frequently taken from the old proverbs or proverbial phrases of the people, upon the themes suggested by which the plays often (as Mr Lewes admirably expresses it) constitute a kind of gloss (plus) in acting. This is the favourite species of the national Spanish theatre; and to the plots of the plays belonging to it the drama of other nations owes a debt almost incalculable in extent. (2) The c. herbóci are distinguished by some of their personages being of royal or very high rank, and by their themes being often historical and large,

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1. El Aseo de Madrid (The Still Water of Madrid), *Drama son Colchid (The Dog on the Monstr),* etc.
2. La Estrella de Sevilla (The Star of Seville, i.e., Sanchos the Brave), *El Nuevo Mundo (Columbus),* etc.
3. *Romu Abramuis (P. as Asha- Nero),
4. Avance Domind (The Convoy of Arucas, 1560),
5. *La Mola de Canario (The Water of Canary),
6. Las Mancelas (The Youthful Adventures) of Col.,
7. Don Bdl de las Ricas Verdes (O. in the Green Branches),
8. El Bartdero de Sevilla y Compania (Piedra (The Receiver of Sevilla, i.e., Don Juan, and the Stone Guest).
of strictly classical tastes protested in essays in prose and verse against the ascendency of the popular drama; the prohibition of Philip II. had been recalled two years after his death and was never renewed; and the activity of the theatre spread through the towns and villages of the land, everywhere under the controlling influence of the school of writers who had established so complete a harmony between the drama and the tastes and tendencies of the people.

The literary and theatrical career of Calderon was most notable in the 17th century. His writings were rather of a national than of an international character, and, if compared with those of his contemporaries, seem to have lacked some of the immediate and direct influence that attaches to the works of genius. In the latter part of the century more closely in the footsteps of the masters without effecting any noticeable changes in the form of the Spanish drama; even the senyeta (till-it), which owes its name to Benavente (1645), was only a kind of entremas. The Spanish drama in all its forms retained its command over the nation, because they were alike popular in origin and character; nor is there any other example of so complete an adaptation of a national art to the national taste and sentiment in its ethics and aesthetics, in the nature of the plots of the plays (whatever their origin), in the motives of their actions, in the conduct and tone and in the very costume of their characters.

National as it was, and because of this very quality, the Decay of Spanish drama was faster to share the lot of the people. At the end of the 17th century, when the Spanish throne at last became the declared apple of discord among the Governments of Europe, the Spanish people lay, in the words of a historian of its later days, "like a corpse, incapable of feeling its own impotence." That national art to which it had so faithfully clung had fallen into decline and decay with the spirit of Spain itself. By the time of the close of the great war, the theatre had sunk into a more amusement of the populace, which during the greater part of the 18th century, while allowing the old masters the measure of favour which accords to traditional art, continued to uphold the representatives of the old drama in its degeneracy—authors on the level of their audiences. But the Spanish court was now The French, and France in the drama, even more than in any other form of art, was the arbiter of taste in Europe. With the restoration of peace accordingly began isolated attempts to impose the French canon of dramatic theory and practice on their theatre; to follow the example of French dramatic practice; and in the middle of the century these endeavours assumed more definite form. Montiano's bloodless tragedy of Virginia (1750), which was never acted, was accompanied by a discourse endeavouring to reconcile the doctrines of the author with the practice of the old Spanish dramatists; the play itself was in blank verse (a metre never used by Calderon, though occasionally by Lope), instead of the old national ballad-measures (the romance-measure, and the rhymed redonda quattrain) preferred by the old masters among the variety of metres employed by them. The earliest Spanish comedy in the French form (a translation only, though written in the national metre) (1751), and the first original Spanish comedy on the same model, Moratin's Petimeta (Petite-Maitresse), printed in 1726 with a critical dissertation, likewise remained unacted. In 1770, however, the same author, Horrinda, wrote his historic drama on a national theme and in the national metre, but adhering to the French rules, appeared on the stage; and similar attempts followed in tragedy by the same writer and others (including Ayala, who ventured in 1775 to compete with Cervantes on the theme of Numancia), and in comedy by Yriarte and Jovellanos (afterwards minister under Godoy), who produced a sentimental comedy in Diderot's manner. But these endeavours failed to effect any change in the popular theatre, which was with more later success raised from its deepest degradation by R. de la Cruz (b. 1731), a fertile author of light pieces of genuine humour, especially senyetas, depicting the manners of the middle and lower classes. In literary circles La Huerta's voluminous collection of the old plays (1785) gave a new impulse to dramatic productivity, and the conflict continued between representatives of the old school, such as Comella (fl. 1786) and of the new, such as the younger Moratin (1780-1829), whose comedies—of which the last

Contemporary of Calderon

Moreto said the comedia de figuras

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1 El Demon Orfeo, etc 2 El Mago Prodigioso; El Purgatorio de San Patrico; La Denuncia de la Cruz 3 El Principe Constante (Don Ferdinand of Portugal) 4 La Dama Duerme (The Faint Lady) 5 Yanez de Soto (Life of a Dream) 6 El Lando Don Diego (Pretty Don Diego) 7 Darden con el Darden (Dread Danner against Dreaden)

8 Izara, La Razon contra la Moda (Lachasse, La Prefije a la Moda) 9 Il Delinquente Honrado (The Honoured Outlaw)
and most successful was in prose—raised him to the foremost position among the dramatists of his age. In tragedy N. de Cienfuegos (d. 1609) likewise showed some originality. After, however, the troubles of the French domination and the war had come to an end, the precepts and examples of the new school failed to reassert themselves. The Spanish dramatists of the present century, after passing, as in the instances of F. Martinez de la Rosa and Breton de los Herrerías, from the system of French comedy to the manner of the national drama, appear either to have stood under the influence of the French romantic school, or to have returned once more to the old national models. Among the former class A. Gil y Zarate, among the latter J. Zorilla, are mentioned as specially prominent. Meanwhile the old popular religious performances are not wholly extinct in Spain, and their relic may long continue to survive there. Whatever may be the future history of one of the most remarkable of dramatic literatures, it may confidently be predicted that so long as Spain is Spain, her theatre will not be permanently denationalized, and that the revolutions it may be destined to undergo are unlikely to extinguish it, whatever degree they may repress, its conservative elements.

The beginnings of the regular drama in France, which here, without absolutely determining, potently swayed its entire course, sprang directly from the literary movement of the Renaissance. De Bellay sounded the note of attack which converted that movement in France into an endeavour to transform the national literature; and in Ronsard the classical school of poetry put forward its conquering hero and sovereign lawgiver. Among the disciples who gathered round Ronsard, and with him formed the "Pieds de l'Académie," as Jodelle, the reformer of the French theatre, Stephen Poitevain (1532-1572), the first to attempt a regular comedy by classical models; but the distance was less between the national faces and Terence, than between the mysteries and moralities, and Seneca and the Greeks. L'Eugène differs little in style from the more elaborate of the old faces; and while it satirizes the foibles of the clergy without any appreciable abatement of the old licence, its theme is the favourite burlesque of the French comic theatre of all times—the courtier. The examples, however, which directly facilitated the productivity of the French comic dramatists of this period, among whom Jean de la Taille was the first to attempt a regular comedy in prose, were those of the Italian stage, which in 1576 established a permanent colony in France, destined to survive there till the close of the 17th century, by which time it had adopted the French language, and was ready to coalesce with French actors, without, however, relinquishing all remembrance of its origin. R. Belcaro (1528-1577), a member of the "Pieds," produced a comedy in which the type (already approached by Jodelle) of the swaggering captain appears, J. Greviscopied the Italian intrigue, characters, and mannera; O. de Torquemada (d. 1581) borrowed the title of one Italian play and perhaps parts of the plots of others; the Florentine F. d'Amboise (d. 1558) produced versions of two Italian comedies; and the foremost French comic poet of the century, P. de Larivey (1550-1612), like an Italian boy on the stage of Pietro Guasto, openly professed to imitate the poets of his native country. His plays are more or less literal translations of L. Dolce, Scicli, and other Italian dramatists; and this lively and witty author, to whom Molière owes much, thus connects two of the most important and successful growths of the modern comic drama.

Before, however, either tragedy or comedy in France entered into the period of their history when genius was to tragedy illuminate both with creations of undying merit, they had, together with the general literature of the country, passed through a new phase of the national life. The troubles and terrors of the great civil and religious wars of the 16th century had in certain spheres of society produced a reaction towards culture and refinement; and the soul had been set upon the results of the Renaissance by Malherbe, the

1 El Se de los Tribos (The Young Scotsman's Companions).
2 Ñe de Soto.
3 Sophocles, Antigone; Electra; Euripides, Iphigenia in Tauris; d'Indy, Armand, Platon (by Ronsard, 1540).

The history of French tragedy begins with the Cléopâtre Captive, in the representation of which the author, together with other members of the "Pieds d'Indy," took the lead in the manner of Seneca, devoid of action and provided with a ghost and a chorus. Though mainly written in the five-foot Iambic couplet, it already contains passages in the Alexandrine metre, which soon afterwards La Ferva by his Médié (pr. 1556) established in French tragedy, and which Jodelle employed in his Didon. Numerous tragedies followed in the same style by various authors, among whom Bonnaux produced the first French regular tragedy on a subject neither Greek nor Roman, and the brothers De la Taille, and J. Grevis, distinguished themselves by their style. Though in the reign of Charles IX. a vain attempt was made by Filicid to introduce the pastoral style of the Italians into French tragedy (while the Broderhood of the Passion was intermingling with pastoral plays its still continued productions of the old entertainments, and the religious drama making its expiring efforts), the classical school, in spite of all difficulties, prevailed. Monchrestien exhibited unusual vigour of rhetoric, and in R. Garner (1545-1601) French tragedy reached the greatest height in nobility and dignity of style, as well as in the exhibition of dramatic passion, to which it attained before Corneille. In his tragedies' choruses are still interlaced among the long Alexandrine stanzas of the dialogue.

During this period, comedy had likewise been influenced by classical models; but the distance was less between the

Italian

influence

French

regular

drama

Jodelle.
father of French style. The people continued to solace or
distract its weariness with its sufferings with the help of the
numerous of that half-cynical gaiety which has always
lighted up the darkest hours of French popular life.
In the troublous days preceding Richelieu's definitive accession
to power (1624) the Tabbardades—a kind of street dialogue
recalling the earliest days of the popular dramas—had made
the Fout-NiCh, the favourite theatre of the Parisian
populars. Meanwhile the influence of Spain, which Henry
IV. had overcome in politics, had throughout his reign and
afterwards been predominant in other spheres, and not the
least in that of literature. The etoile culte, of which Gongora
was the native Spanish, Marmo the Italian, and
Lyly the English representative, asserted its dominion over
the favourite authors of French society; the pastoral
romance of Honord de Urfé—the text-book of pseudo-pastoral
gallantry—was the parent of the romances of the Scudéry
and De la Calprenède; the Hôtel de Rambouillet was in its
glory; the true (not the false)
tragedies of its defects. A mixture of the forms of classical comedy
and the drama. Everybody knew by heart Gongora's version
of the French drama, the appearance of Corneille's
Tristan S (1601-1655)
and De la
CarrIer. The mould of French tragedy was cast
in the days of the popular
stages, on the model of the classical tragedy of
Scudéry—Le Mentor, the parent of a numerous dramatic progeny)—
was itself derived from a Spanish original, which it did
not (as was the ease with the Cid) transform into something
new. French tragi-comedy Corneille can hardly be said
to have invented; and of the mongrel growth of sentimental
comedy, domestic drama or drame, he rather suggested than
exemplified the conditions.

The tragic art of Racine (1639-1699) supplements Racine's,
rather than surpassed that of his older contemporary. His
works reflect the serene and settled formality of an age in
which the sun of monarchy shone with an effulgence no
clouds seemed capable of obscuring, and in which the life
of a nation seemed reducible to the surroundings of a court.
The tone of the poetic literature of such an age is not
necessarily unreal, because the range of its ideas is limited,
and because its forms seem to exist by an immutable
authority. Madame de Sévigné said of Racine, whose plays
so well suited themselves to the successive phases in the
life of Louis XIV., that in his later years he loved God as
he had formerly loved his mistresses; and this sally at all
events indicates the range of passions which inspired his
tragic muse. His heroes are all of one type—that of
deprived itself to the art of which it claimed to furnish
theatre and for the national
romance of Honore
and others; and among these
and it is not (as
throughout its history)
its heights do not lose themselves
to the exhibition of conflicts political rather than broadly
ethical in their significances. The defects of his style are
of less moment; but in this, as in other respects, he was,
with all his strength and brilliance, not one of those rarest
of artists who are at once the example and the despair of
their successors.

In comedy also Corneille begins the first great original His
epoch of French dramatic literature; for it was to him that
comedia
and
tragedia
were
owed the inart of which they are and style which
he made those of the higher forms of French comedy. But
Le Menteur (the parent of a numerous dramatic progeny)—
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speech are cadenced by a modern measure. In construction, the simplicity and regularity of the ancient models are stereotyped into a rigid etiquette by the exigencies of the court-theatre, which is an apartment of the palace. The unity of time and place, with the Greeks mere rules of convenience, French tragedy imposes upon itself as a permanent yoke. The European prologue is judiciously exchanged for the exposition of the first act, and the lyrical element essential to Greek tragedy is easily suppressed in its would-be copy; lyrical passages still occur in some of Corneille's early masterpieces, but the chorus is consistently banished, to reappear only in Racine's latest works as a scholastic experiment appropriate to a conventional atmosphere. Its uses for explanation and comment are served by the expeditor, which in its turn becomes conventional, of the conversations with confidantes and confidantes, which more than sufficiently supply the fail of general sentiments. The epical element is allowed full play in narrative passages, more especially in those which relate parts of the catastrophe, and, while preserving the stage intact from realisms, assimilates itself to the generally rhetorical character of this species of the tragic drama. This character imposes itself more and more upon the tragic art of a rhetorical nation in an age when the loftiest themes are elsewhere (in the pulpit) receiving the most artistic oratorical treatment, and develops in the style of French tragedy the qualities which cause it to become something between prose and poetry—or to appear (in the phrase of a French critic) like prose in full dress. The force of this description is borne out by the fact that the distinction between the verisimilitude of French tragedy and that of French comedy is at times an imperceptible one.

The universal genius of Voltaire (1694–1778) found it necessary to shine in all branches of literature, and in tragedy to surpass predecessors whom his own authority declared to have surpassed the efforts of the Attic muse. He succeeded in impressing the world with the belief that his innovations had imparted a fresh vitality to French tragedy, in truth, however, they represent no essential admeasure in art, but rather augmented the rhetorical tendency which paralyzes true dramatic life. Such life as his plays possess lies in their political and social sentiments, their invective against tyranny, and their exposure of fanaticism. In other respects his versatility was barren of enduring results. He might take his themes from French history, or from Chinese, or Egyptian, or Syrian, from the days of the Epigon or from those of the Crusades; he might appreciate Shakespeare, with a more or less partial comprehension of his strength, and consequently borrow from and improve the barbarian. But he added nothing to French tragedy where it was weakest—in character; and where it was strongest—in diction—he never equalled Corneille in fire or Racine in refinement. While the criticism to which French tragedy in this age at last began to be subjected has left unimpaired the real titles to immortality of its great masters, the French theatre itself has all but buried in respectful oblivion the dramatic works bearing the name of Voltaire—a name second to none in the history of modern progress and of modern civilization.

As it is of relatively little interest to note the ramifications of an art in its decline, the contrasts need not be pursued among the contemporaries of Voltaire, between his

imitator Saurin (1706–1781), Saurin's royalist rival Le Belloy (1727–1775), Racine's imitator Lagrange-Chancel (1676–1758), and Voltaire's own would-be rival, the "terrible" Crebillon the elder (1674–1742), who professed to vindicate to French tragedy, already mistress of the heavens through Corneille, and of the earth through Racine, Pluto's supplementary realm, but who, though thus essaying to carry tragedy lower, failed to carry it further. In the latter part of the 18th century French classical tragedy as a literary growth was dying a slow death; however numerous might be the leaves which sprouted from the decaying tree its form had been permanently fixed; and even Shakespeare, as manipulated by Ducis (1735–1816)—an author whose tastes were better than his times—failed to bring about a change. "It is a Moor, not a Frenchman, who has written this play," cried a spectator of Ducis's Othello (1791), but though Talma might astonish the theatre, Shakespeare's influence over the French drama was only gradually preparing itself, by means more especially of Letourneur's translation (1775–1782), which attracted the sympathy of Dodert and the excitements of the aged Voltaire The command which classical French tragedy continued to assert over the stage was due in part, no doubt, to the love of Roman drapery which in more than one sense characterized the Revolution, and which was by the Revolution handed down to the Empire. It was likewise, and more signally, due to the great stage actors who freed the tragic stage from much of its artificiality and animated it by their genius. No great artist has ever more generously estimated the labours of a predecessor than Talma (1763–1826) judged those of Le Rain (1728–1778); but it was Talma himself whose genius was pre-eminently fitted to reproduce the great figures of antiquity in his muse, which, like the world outside, both required and possessed its Caesar. He, like Rachel (1821–1858) after him, reconciled French classical tragedy with nature, and it is upon the art of great original actors such as these that the theatrical future of this form of the drama in France depends. Mere whims of fashion—even when inspired by political feeling—will not wait back to it a real popularity; nor will occasional literary aftergrowths, however inerterious, such as the effective Lucrèce of F. Poussard, and the attempts of even more recent writers, suffice to re-establish a living union between it and the progress of the national literature.

The rival influences under which classical tragedy has Comedy, become a thing of the past in French literature connect themselves with the history of French comedy, which under the co-operation of other influences produced a wide variety of growths. The germ of most of these—though not of all—are to be found in the works of the most versatile, and, in some respects, the most consummate comic dramatist the world has known,—Molière (1622–1673). Molière. What Molière found in existence was a comedy of intrigue, derived from Spanish or Italian examples, and the elements of a comedy of character, in French and more especially in Italian farce and ballet-pantomime. Corneille's Menteur had pointed the way to a fuller combination of character with intrigue, and in this direction Molière's genius exercised the height of its creative powers. After beginning with farces, he produced in the earliest of his plays (from 1652), of which more than fragments remain, comedies of intrigue which are at the same time marvelously lively pictures of manners, and then proceeded with the École des Maris (1661) to begin a long series of masterpieces of comedy of character. Yet even these, the chief of which are altogether unrivalled in dramatic literature, do not exhaust the variety of his productions. To define the

1. La Cid; Polyeucte.
2. Figaro, Athéna.
3. Corneille, Roderique; Racine, Phèdre.
4. Brutus, La Mort de Clovis, Shamiram.
5. Éphys. La Faussettaine (Molière).
6. Adèle de Château, La Guerre des Trois Chiffres.
8. Olympe. 11. Tamarise. 12. La Mort de Clovis; Zaire, (Othello);
range of his art is as difficult as to express in words the essence of his genius. For though he has been copied over since his time, neither his spirit nor his manner has descended in full to any of his copyists, whole schools of whom have missed elements of both. A Molière can only be judged in his relations to the history of comedy at large. He was indeed the inheritor of many forms and styles—remaining a stranger to those of Old Attic comedy only, rooted as it was in the political life of a free imperial city; though even the rich extravagance of Aristophanes’s burlesque was not left wholly unreproduced by him. Molière is both a satirist and a humourist; he displays at times the sentiments of a loyal courtier, at others that gay spirit of opposition which is all but indispensable to a popular French wit. His comedies offer elaborate and subtle—e'en tender—pictures of human character in its eternal types, lively sketches of social follies and literary extravagances, and broad appeals to the ordinary sources of vulgar meritment. Light and perspicuous in construction, he is master of the delicate play of irony, the penetrating force of wit, and the expansive gaiety of frolicsome fun. Faithful to the canons of artistic taste, and under the safe guidance of true natural humour, his style suits itself to every species attempted by him. His morality is the reverse of rigid, but its aberrations are not those of prudence. In its laws those of pretence; and wholly free as he was from the didactic aim which is foreign to all true dramatic representation, the services he rendered to his art are not the less services rendered to society, concerning which the laughter of true comedy tells the truth. He raised the comedy of character out of the lower sphere of caricature, and in his greatest comedies subordinated to the highest ends of all dramatic composition the plots he so skilfully built, and the pictures of the manners he so faithfully reproduced.

Even among the French comic dramatists of this age there must have been many who, if Molière was its greatest poet, for though he had made the true path luminous to them, their efforts were still often of a tentative kind, and one was reviving Pardon while another was translating the Andries. A more unique attempt was made in one of the very few really modern versions of an Aristophanes’s comedy, which deserves to be called an original copy—Les Pléiades de Racine. The tragic poet Quinault and Camisparton likewise wrote comedies, one or more of which furnished materials to contemporary English dramatists, as did one of the felicitous plays in which Boursault (1658–1701) introduced Mercury and Eos into the theatrical envoi. But if the mantle of Molière can be said to have fallen upon any of his contemporaries or successors, this honour must be ascribed to J. F. Regnard (1655–1700), who imitated the great master in both themes and characters, while the skillfulness of his plots, and his gaiety of the treatment even of subjects tempting into the by-path of sentimental comedy, entitled him to be regarded as a comic poet of original genius. In the next generation (that of Voltaire) this by-path threatened to become the chosen walk of comedy, though Grescat (1709–1777) still attempted comedy of character, and the witty Firon (1689–1779) produced something like a new type in the hero of his epigrammatic, but hardly dramatic, Ménagère. Marivaux (1658–1763), "the French spectator," whose minute analysis of the tender passion enriched the scorn of Voltaire, forms the connecting link between comedy and the mixed species of the sentimental or "tearful" domestic drama, which still retained the name, but no longer pursued the ends, of the comic art. The sentimentally effective and professedly didactic dramatic moralists of this school were Destouches (1650–1754) and Nivelle de la Chaussée (1692–1754), in whose hands French comedy became a champion of the sanctity of marriage and reproduced the sentiments—in one instance even the characters—of Richardson.

Melpomene, humbly shod with the stock, and Thalia, dissolved in tears, had now entered into partnership. The species which varied as comédie burlesque or as comédie bourgeoisie, and which ruled or was to rule supreme in so many dramatic literatures of Europe, more and more firmly established its hold on that of France. In the hands of Diderot (1713–1784) it sought to proclaim itself as an agent of social reform, and as an apostle of the gospel of philanthropy; but the execution of these works fell short of their aims; it was, in Mme. de Staël’s words, "the affection of nature," not nature itself which they exhibited. Their author announced them as examples of a third dramatic form—the genre sérieux—which he declared to be the consummation of the comic art. Making war upon the frigid artificiality of classical tragedy, he began it verse from the new species. The effect of these plays was intended to spring from their truth to nature—a truth such as no spectator could mistake, and which should bring home its moral teachings to the business as well as the bosoms of all. The theatre was to become a real and realistic school of the principles of society and of the conduct of life; it was, in other words, to usurp functions with which it has no concern, and to essay the reformation of mankind. The idea was neither new nor just, but its speciousness will probably continue to commend it to many benevolent minds, in whatever shape it is revived.

From this point the history of the French drama becomes that of a conflict between an enfeebled artistic comedy of the Revolution and the name of a school at all. Beaumarchais (1732–1799), the first for his early sentimental plays, in which he imitated Empson’s Empyre. Diderot, invented the apellation drame—en convening the vagueness that it became the accepted name of the hybrid species to which they belonged—in two works of a very different kind, the famous Barbier de Séville and the still more famous Mariage de Figaro, boldly carried comedy back into its old Spanish atmosphere of intrigue; but while surpassing all his predecessors in the skill with which he constructed his frivolous plots, he drew his characters with a lightness and sureness of touch peculiar to himself, animated his dialogue with an unparalleled brilliancy of wit, and seasoned action as well as dialogue with a political and social meaning, which caused his epigrams to become proverb and which marks his Figaro as a herald of the Revolution. Such plays as these were ill suited to the rule of the despot whose vigilance could not overlook their significance. The comedy of the empire is, in the hands of Collin d’Harleville, Picard, A. Duval, Étiene, and others, mainly a harmless comedy of manners; nor was the attempted innovation of N. Lemercier (1771–1840)—who was fain to invent a new species, that of historical comedy—more than a flattering self-delusion. The theatre had its share in all the movements and changes which ensued in

1 Quinault, L’Amour Indécis (Newcastle and Dryden’s Sir Martin Marcell).
2 Le Mercure Galant; Ésop à la Ville; Ésop à la Cour (Vanbrugh, Dryden).
3 Le Bot, M. de Pourceaugnac; Geronst in Le Lopitérac Universel (Argan in Le Malheu Imaginari); La Critique du L. (Le C. de l’École des Fines).
4 Le Jeu de la Légère; Le Lopitérac Universel.
5 Le Michaud.

9 Le De l’Amour et du Hilaré; La Lige; La Surprise de l’Amour; Les Fousse Conférences, L’Épine.
10 Le Dianipèdre; Le Glauque, etc.
11 La Chasse à l’Amoureuse; Le Prêtris à la Mode; Mélanie.
12 Pamela.
13 Le Pilz Naturel ou les Épines de la Verte; Le Père de Famille.
France; but the impulse which gave rise to the revolution the drama itself was to undergo was not one of native origin. Those branches of the drama which belong specifically to the history of the opera, or which associate themselves with it, are here passed over. (See OPERA.)

The stage of the dramatic school of French drama, however, was the neoclassical (from Val de Vire to Calvados), which began as an interpenetration of pantomime with the airs of popular songs, and which, after the Italian masks had been removed from it, was cultivated by Ponsard (1690–1765) and Marmontel (1723–1799). The latter, as well as Rousseau,5 likewise composed opérettes, a smaller kind of opera, at first of the pastoral sort, and these flexible species easily entered into combination. The melodrama proper, of which the invention is also attributed to Rousseau,6 in its latter development became merely a drama acousticated by music, though usually in little need of any accentuation.

The chief home of the regular drama, however, demanded efforts of another kind. At the Théâtre Français, or Comédie Française, whose history as that of a single company of actors had begun in 1660, the party-strife of the time made itself audible; and the most prominent tragic poet of the Revolution, M. J. de Chénier (1764–1811), a disciple of Voltairé in dramatic poetry as well as in political philosophy, wrote for the national stage the historical drama—with a political moral—in which in the memorable year 1789 Talma achieved his first complete triumph. But the victorious Revolution proclaimed among other liberties that of the theatres in Paris, of which soon not less than 50 were open. In 1807 the empire restricted the number to 9, and reinstated the Théâtre Français in sole possession (or nearly such) of the right of performing the classic drama. No writer of note was, however, tempted or inspired by the rewards and other encouragements offered by Napoleon to produce such a classic tragedy as the emperor would have willingly stamped out of the earth.

The tragedies of C. Delavigne (1794–1844) represent the transition from the expiring efforts of the classical to the ambitious beginnings of the romantic school of the French drama. Of this it must suffice to say that it derives some of its characteristics from the general movement of romanticism which in various ways and at various points of time transformed nearly every modern European literature, coming from the rhetorical tendency which is a French national feature. Victor Hugo was its conquering founder; A. Dumas the elder (1803–1870) its middleman. The marvellous energy and poetic genius of the former, always in extremes, was nowhere more signally so than in the drama; the latter was a Briareus, working with many hands besides his own. The name of A. de Vigny (1799–1863), "George Sand" (1804–1876), A. de Musset (1810–1857), whose dramatic "proverbs" and other pieces of a similar kind have a delicate flavour all their own, and perhaps that of P. Mérimeé (1803–1870), who invented not only Spanish dramas but a Spanish dramatist,5 may be all with more or less precision classed in the romantic school, which in its turn has come to an end as a productive body of writers. It was not, however, the brief classical revival begun by P. Ponsard and continued, in closer relation to modern ideas, both by him and by E. Augier, which overthrew the Romanticists. While the theatrical ability of E. Scribe (1791–1858) supplied a long series of productions attesting the rapid advance of the playwright's mastery over the secrets of his craft, and while the name of his competitors, with the aid of some of whom he held his own against the rest, is legion, the latest developments of the French drama possess a social and often a moral interest of greater depth, while they are not inferior in technical skill to anything that has preceded them. After a fashion which would have startled even Diderot, the younger A. Dumas has undertaken to reform society by means of the stage; O. Feuillet and others have, with perhaps fewer prefaces, applied themselves to the solution of the same "problems;" and whatever style will best succeed with the public is the style of V. Sardou.

That the theatre will lose the hold it possesses over the intellectual and moral sympathies of nearly the whole of the educated, and of a great part of the uneducated population of France, seems hardly within the range of probability. But this is not tantamount to a prophecy that the creative activity of French dramatic literature is certain to endure. The art of acting is not dependent upon a contemporary literary productivity; Talma and Midle Mars (1779–1847) flourished in one of the most barren ages of the French literary drama; the authors and actors of the sottises, like those of the Palais Royal farces of our own day, could strike their roots in the lightest of soils. The constantly accumulating experience and the apparently inexhaustible fertility of the art of acting in France may ensure to it a future not less brilliant than its past; and the judicious policy of not leaving the leading theatres at the mercy of shifting fashion will at all events supply the possibility of maintaining a high artistic standard. So long as the French nation continues to maintain its ascendancy over other nations in much that adorns and brightens social life, the predominant influence of the French theatre over the theatres of other nations is likewise assured. But in the end its own future must be ruled by that progress or decay of French dramatic literature. The history of that literature shows periods of marvellously rapid advance, of hardly less swift decline, and of frequent though fitful recovery. Its future may be equally varied, but it will not be less dependent on the conditions which in every people, ancient or modern, are indispensable to national vigour and vitality. Should the calamity—for it would be nothing less—befall modern civilization of a hopeless degeneration of the French drama, the fault will lie in the severance of self-consciousness from self-control; and, under other circumstances, but with even deeper regret, the story of the Roman theatre of the later Empire may have to be told again.

Among the nations of Germanic descent, but one—our English own—succeeded under the influence of the Renaissance movement in transforming the last growths of the mediaeval drama into the beginnings of a great and enduring national dramatic literature. This transformation connects itself with one of the greatest epochs of the national history, more properly speaking, forms part of it; the Elizabethan drama and the Elizabethan age are, it is no exaggeration to assert, equally inconceivable one without the other.

It has been seen how already in the reign of Edward Beguining V., the breath of a new age with its "new learning" had quickened the relatively inanimate species of the morality drama, first into the chronicle history (still intermingled with remnants of the earlier species); and how at an earlier date John Heywood's interludes had bridged the distance separating from only partially relieved abstractions the concrete directness of comedy proper. Soon afterwards, the study and imitation of the ancient classical drama were introduced into the English world of letters; and under their influence tragedy and comedy, which might otherwise have from the first coalesced, were in their early growths by our literature kept sunder, though not absolutely so. Already, in Queen Mary's reign, translation was found the readiest form of expression offering itself to literary scholar-
Earliest tragedies.

Some ship, and Italian examples helped to commend Seneca, the most modern of the ancient tragedians, as a favourite author for such exercises. With the year of Elizabeth's accession began a series of translations of his plays by Jasper Heywood (John Heywood's son) and others; and to the direct influence of one of Seneca's tragedies is to be ascribed the composition of the first tragedy proper in the English tongue, the "Gorboduc" (afterwards renamed "Pericles and Perseus") of T. Sackville, Lord Buckhurst, with whom T. Norton was joint author (1563). Though, unlike "Gorboduc," classical in theme, and in some respects approaching nearer to the true conception of tragedy in their treatment of dramatic passion, the nearly contemporary "Ajax" and "Virginia" (c. 1563) and Preston's "Cambridge King of Peraea," it was Shakespeare's jars of Euripides (1566), and of R. Edward's "Damon and Phaethon," 1571), which calls itself a comedy, and is in fact a mixture of both species. Simultaneously with the influence, directly or indirectly exercised, of classical literature, that of Italian, both dramatic and narrative, asserted itself; early works from this source were the first "Romeo and Juliet" (not preserved, but apparently anterior in date even to "Gorboduc"), Tancred and Gumatia (1563), and "Whetstone's Promos and Cassandra" (printed 1578), from which Shakespeare took the story of "Measure for Measure." From the double danger which threatened our tragic drama in the days of its infancy—that it would congeal on the cold heights of classical themes, or dissolve its vigour in the glowing heat of a passion fiercer than that of the Italians ("Inglesi Italianato è un dio volo inincerto")—it was preserved, more than by any other cause, by its happy association with the traditions of the national history. The crudes growth of the chronicle history proved strong enough to assert itself by the side of tragedy based on classical and Italian models; and in a series of works of more or less uncertain dates, a vein was worked from which Shakespeare was to draw the richest ore. Among these rude compositions, which intermixed the blank verse introduced art in harmony with the tastes and tendencies of the time, the earliest extant English comedy, N. Udall's "Ralph Roister Doister," which cannot be dated later than 1551, may be described as a genuinely English adaptation of Plautus, while its successor, "Gammer Gurton's Needle," printed 1575, and probably written by (Bishop) Still, has an original, and in consequence a slighter, though by no means unmasterly, plot. In the main, however, our early English comedy, while occasionally introducing characters of genuinely native origin, and appealing to the traditional humour of Will Summer, the court-fool of Henry VIII, or Grin, the collie of Croydon, was content to borrow its themes from Italian or classical sources; Aristotle's "Supposi" found a translator in Gascoigne (1566), and the Menagius of Plautus translators or imitators in writers of rather later dates. While on the one hand the mixture of tragic with comic motives was already leading in the direction of tragic-comedy, the precedent of the Italian pastoral drama encouraged the introduction of figures and stories from classical mythology; and the rapid and versatile influence of Italian comedy seemed likely to continue to control the progress of the lighter branch of the English drama. One of such promises as these the glories of our drama Conditions were ripened by the warmth and light of the great of the Elizabethan age—of which the beginnings may fairly be reckoned from the third decennium of the reign to which it owes its name. The queen's steady love of dramatic entertainments could not of itself have led, though it undoubtedly contributed, to such a result. Against the attacks which a nascent puritanism was already directing against the stage by the hands of Northbrooks, the repentant playwright Gosson, Stubbes, and others, were to be set not only the barren favour of royalty, and the more direct patronage of great nobles, but the fact that literary authorities were already weighing the claims of both tragedy and comedy were upheld by those who shrunk from the desipience of idle pastimes. As the popularity of the stage increased, the functions of playwright and actor, whether combined or not, began to fall within a reasonable promise of personal gain. Nor, above all, was that higher impulse, which leads men of talent and genius to attempt forms of art in harmony with the tastes and tendencies of their times, wanting to the group of writers who can be remembered by no nobler name than that of Shakespeare's predecessors.

The lives of all of these are, of course, in part contemptible. The propaganda with the life of Shakespeare himself; nor was there any substantial difference in the circumstances under which of Shake-peare's career was to take place, and the first of them, and he, led their lives as dramatic authors. A distinction was manifestly kept up between poets and playwrights. Of the contempt entertained for the actor's profession some fell to the share of the dramatist; "even and bold," says Dr Ingleby, "who had indeed never trod the stage, but had written several plays, and had no reason to be ashamed of his antecedents, speaks of the vocation of the play-maker as sharing the odium attaching to the actor." Among the dramatists themselves good fellowship and literary partnership only at times asserted themselves as stronger than the tendency to mutual jealousy and abuse; of all chapters of dramatic history, the annals of the early Elizabethan stage perhaps least resemble those of Arcadia.

Moreover, the theatre had hardly found its strength. History of as a powerful element in the national life, when it was involved in a bitter controversy, with which it had to hearken to no connections of the court or the courtly; and with sympathy with it can only have been of a very limited

1 Thetis.

8 Mesopon. 2 The History of the Collier. 3 The Supposes. 4 A History of Error (). 577; The Menagius taken out of Plautus (pr. 1565).
kind. The Marpellite controversy in 1589 led to a stoppage of stage plays which proved only temporary; but the general result of the attempt to make the stage a vehicle of political abuse and invective was beyond a doubt to censor and degrade both plays and players. The true remedy was at last applied, when from about the year 1594 the chief London actors became divided into two great rival companies—the Lord Chamberlain’s and the Lord Admiral’s—whence alone received licences. Instead of half-a-dozen or more companies whose jealousies communicated themselves to the playwrights belonging to them, there were now, besides the Children of the Chapel, two established bodies of actors, directed by steady and, in the full sense of the word, respectable men. To the Lord Chamberlain’s Company, which, after being settled at the “Theater,” moved to the Globe on the Bankside in 1599, Shakespeare and Richard Burbage, the greatest of the Elizabethan actors, belonged; the Lord Admiral’s was managed by Philip Henslowe, the author of the Diary, and Edward Alleyn, the founder of Dulwich College, and was ultimately, in 1600, settled at the Fortune. In these and other houses were performed the plays of our Elizabethan dramatists, with few adventitious aids, the performance being crowded into a brief afternoon, when it is obvious that only the idler sections of the population could attend. No woman might appear at a playhouse unless masked; on the stage, down to the Restoration, women’s parts continued to be acted by boys.

It is futile to take no account of such outward circumstances as these and many which cannot here be noted in surveying the progress of the literature of the Elizabethan drama. No dramatic literature which has any claim to rank beside it—not that of Athens nor those of modern Italy and Spain, nor those of France and Germany in their classic periods—had to contend against such odds, a mighty inherent strength alone ensuring to it the vitality which it so triumphantly asserted, and which enabled it to run so unequalled a course.

Among Shakespeare’s predecessors John Lyly (1554–1600), whose plays were all written for the Children of the Chapel and the Children of St Paul’s, holds a position apart in our dramatic literature. The euphues, to which his famous romance gave its name, likewise distinguishes his mythological, quasi-historical, allegorical, and satirical comedies. But his real service to the progress of our drama is to be sought neither in his choice of subjects nor in his imagery—though both fondness for fairy lore and for the whole phantasmagoria of legend, classical as well as romantic, his contemporaries, and Shakespeare in particular, were indebted for a stimulative precedent. It lies in his adoption of Gassentaigne’s innovation of writing plays in prose; and in his heaving, though under the fetters of an affected and vicious style, given the first example of brisk and vivacious dialogue—an example to which even such successors as Shakespeare and Jonson were indebted. Thomas Kyd (c. 1584), the author of the Spanish Tragedy, possesses some of the characteristics, but none of the genius, of the greatest tragic dramatist who preceded Shakespeare. No higher tribute than this is assuredly the due of Christopher Marlowe (1564–1593), whose violent and prematurely closed a poetic career of dazzling brilliancy. His earliest play, Tamburlaine the Great, in which the use of blank verse was introduced, and full of the “high astounding terms” of an extravagant and often bombastic diction, is already marked by the passion which was this poet’s most characteristic feature, and which was to find expression so luxuriant in his Doctor Faustus and so surpassingly violent in his Jew of Malat this master-piece, Edward II., is a tragedy of singular pathos and of a dramatic power unapproached by any of his contemporaries.

George Peele (1558–1596?) was a far more versatile writer even as a dramatist, but though his plays contain passages of exquisite beauty, not one of them is worthy to be ranked by the side of Marlowe’s Edward II., compared with which, if indeed not absolutely, Peele’s Chronicle of Edward I. still stands on the level of the species to which its title and character alike assign it. His finest play is undoubtedly David and Bethsabe, which resembles Edward I. in construction, but far surpasses it in beauty of language and versification, besides treating its subject with greatly superior dignity. If the difference between Peele and Shakespeare is still in many respects besides that of genius an immemorial one, we seem to come into something like a Shakespearean atmosphere in more than one passage of the plays of the unfortunate Robert Greene (1591–1592), whose unfortunate perhaps in nothing more enduringly than in his notorious enmity to Shakespeare himself. His genius, which shone most brightly in plays treating English life and scenes, was in the main free from the pedantry which occasionally besets the flight of Peele’s and even of Marlowe’s muse; and his most delightful work at all events seems to breathe something of that indescribable freshness which we recognise, if not as a peculiarly Shakespearean characteristic, at least as one belonging to none but a truly national art. Thomas Lodge (c. 1558–1635), Thomas Nash the redoubtable pamphleteer (c. 1565–c. 1603), Henry Chettle (1594–c. 1617), who worked the chords of both pitty and terror with equal vigour, and Anthony Munday (1553–1633), better remembered for his city pamphlets than for his plays, are among the other more generally known writers of the early Elizabethan drama, though not all of them can strongly speaking be called predecessors of Shakespeare.

The common characteristics of nearly all these dramatists were in accordance with those of the great age to which they belonged. Stirring times called for stirring themes, such as those of “Malonnet, Sippo, and Tamurkane,” and these again for a corresponding vigour of treatment. Neatness and symmetry of construction were neglected for fulness and variety of matter. Novelty and grandeur of subject seemed well matched by a swelling amplitude and often reckless extravagance of diction. As if from an inner necessity, the balance of rhymed couplets gave way to the impetuous march of blank verse; “strong lines” were as in-evitably called for as strong situations and strong characters. Distinct as the chief of these poets are from one another by the marks impressed upon both form and matter by individual genius, yet the stamp of the age is upon them all. Writing for the stage only, of which some of them possessed a personal experience, they acquired an instinctive insight into the laws of dramatic cause and effect, and infused a warm vitality into the dramatic literature which they produced, so as to produce, immediate consumption. On the other hand, the same cause made rapidity of workmanship indispensable to a successful playwright. How a play was produced, how many hands had been at work upon it, what loans and what spoliation had been made in the process, were considerations of less moment than the question whether it was produced, and whether it succeeded. His harness—frequently double or triple—was inseparable from the lusty Pegasus of the early English drama, and its genius toiled, to borrow the phrase of the Attic comedian, "like an Arcadian mercenary."
This period of our drama, though it is far from being one of crude effort, could not therefore yet be one of full consummation. In tragedy the advance which had been made in the choice of great themes, in knitting closer the connection between the theatre and the national history, in vindicating to passion its right to adequate expression, was already enormous. In comedy the advance had been less decisive and less independent; much had been gained in reaching greater freedom of form and something in enlarging the range of subjects; but artificiality had proved a snare in the one direction, while the licence of the comic stage, upheld by favourite "clowns," such as Kemp or Tarleton, had not succumbed before more exacting demands. The way of escaping the dilemma had, however, been already recognized to lie in the construction of suitable plots, for which a full storehouse was open in the popular traditions preserved in national ballads, and in the growing literature of translated foreign fiction, or of native imitations of it. Meanwhile, the aberration of the comic stage to political and religious controversy, which it could never hope to treat with real freedom in a country provided with a strong monarchy and a dogmatic religion, seemed likely to extinguish the promise of the beginnings of English romantic comedy.

These were the circumstances under which the greatest of dramatists began to devote his genius to the theatre. Shakespeare's career as a writer of plays can have suffered little in its beginnings from those of his contemporaries and rivals. Before or while he was proceeding from the re-touching and re-writing of the plays of others to original dramatic composition, the most gifted of those we have termed his predecessors had passed away. He had been destined as an actor before he was known as an author; and after living through days of darkness for the theatre, if not for himself, attained, before the close of the century, to the beginnings of his prosperity and the beginnings of his fame. But if we call him fortunate, it is not because of such enfranchisement.

With equal power and variety the working of those passions in the mastery of which over man lies his doom? Here, above all, Shakespeare as compared with his predecessors, as well as with his successors, "is that nature which they paint and draw." He threw open to modern tragedy a range of hitherto unknown breadth and depth and height, and emancipated the national drama in its noblest forms from limits to which it could never again restrict itself without a consciousness of having renounced its enfranchisement. Happily for the variety of his creative genius on the English stage, no divorce had been proclaimed between the serious and the comic, and no division of species had been established such as he himself ridicules as pedantic when it professes to be exhaustive. The comedies of Shakespeare accordingly refuse to be tabulated in deference to any method of classification deserving to be called precise; and several of them are comedies only according to a purely technical use of the term. In those in which the comic interest asserts itself to the instinct of reader or spectator as supreme, it is still of its nature incidental to the progress of the action; and if it seems a just criticism (and one agreeing with what we can conclude as to Shakespeare's process of construction) that all of his comedies but one is in both design and effect a comedy of character proper. Thus in this direction, while the unparalleled wealth of his invention renewed or created a whole gallery of types, he left much to be done by his successors, while the true secrets of his comic art, which interweaves fancy with observation, draws wisdom from the lips of fools, and imbues with character what all other hands would have left shadowy, monstrous, or trivial, are among the things inimitable belonging to the individuality of his poetic genius.

The influences of Shakespeare's diction and versification upon those of the English drama in general can hardly be over-rated, though it would be next to impossible to state them definitely. In these points, Shakespeare's manner as a writer was progressive; and this progress has been deemed sufficiently well traceable in his plays to be used as an aid in seeking to determine their chronological sequence. The

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1. Henry VIII.
2. Edward IV.
3. If You Know Not Me, Sir, Ford, Perkin Warbeck.
4. Edward VIII.
5. The Merry Wives of Windsor.
Influence of his method of construction.

His character.

The masque.

The mask.

Influences upon the English versified drama.

Scenes in the later Elizabethan drama.

The wayward flower.

The poetic orator.

The poetical drama.

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(1634) composed one of the loftiest and loveliest of English poems. Comus has been judged and condemned as a drama—unduly, for the dramatic qualities of a mask are not essential to the species. Nor need its history in England have here been referred to, were it not so inseparably connected with that of the Elizabethan drama. In later times the mask merged into the opera, or continued a humble life of its own apart from literary effort. It is strange that our later poets should have done so little to restore to its nobler uses, and to invest with a new significance, a form of so proved a flexibility as the poetic mask.

The annals of our drama proper in the period reaching from the closing years of Elizabeth to the outbreak of the great Revolution include, together with numerous names relatively insignificant, many illustrious in the history of our poetic literature. Among Shakespeare's contemporaries and successors there is, however, but one who by the energy of his genius, not less than by the circumstances of his literary career, stands in a position of undisputed primacy among his fellows. Ben Jonson (1572-1635), to whom in his latter days a whole generation of younger writers did homage as to their veteran chief, was alone in full truth the founder of a school or family of dramatists. Yet his pre-eminence did not (whatever he or his followers may have thought) extend to both branches of the regular drama. In tragedy he fell short of the highest success; the weight of his learning lay too heavily upon his efforts to draw from deeper sources than those which had sufficed for Shakespeare. Such as they are, his tragic works stand almost, though not quite, alone in this period as examples of sustained effort in historic tragedy proper. G. Chapman (1557 or 1559-1634) treated stirring themes, more especially from modern French history, always with vigour, and at times with genuine effectiveness; but though rich in beauties of detail, he failed in this branch of the drama to follow Shakespeare even at a distance in the supreme art of fully developing a character by means of the action. Mention has already been made of Ford's isolated effort in the direction of historic tragedy and of those excursions into the still popular domain of the chronicle history by T. Heywood, Dekker, and others, which are to be regarded as nothing more than attempts to compete with him in the wide variety of sources, and consequent apparent variety of themes, the number of motives employed—at least as a rule—in the tragic drama of this period was comparatively small and limited. Hence it is that, notwithstanding the diversity of subjects among the tragic dramas of such writers as Marston, Webster, Fletcher, Ford, and Shirley, an impression of sameness is left upon us by a connected perusal of these works. Politic ambition, conjugal jealousy, absolute female devotion, unbridled masculine passion, such are the motives which constantly recur in the Decameron of our later Elizabethan drama. And this impression is heightened by the want of moderation, by the excess of passion, which these dramatists so habitually exhibit in the treatment of their favourite themes. All the tragic poets of this period are not equally amenable to this charge; in J. Webster* (c. 1650), master as he is of the effects of the horrid, and in J. Ford* (1586-1649), surpassingly seductive in his sweetness, the monotony of exaggerated passion is broken by those marvellously sudden and subtle touches through which their tragic genius creates its most thrilling effects. Nor will the tendency to excess of passion which F. Beaumont (1586-1616) and J. Fletcher (1576-1625) undoubtedly exhibit be confounded with their distinctive power of sustaining tenderly pathetic characters and situations in a degree unequalled by any of their contemporaries—a power seconded by a beauty of diction and softness of versification which for a time raised them to the highest pinnacle of popularity, and which entitles them in their conjunction, and Fletcher as an independent worker, to an enduring pre-eminence among their fellows. In their morals Beaumont and Fletcher are not above the level of their age. The manliness of sentiment which ennobles the rhetorical genius of F. Massinger (1584-1640), and the gift of poetic illustration which entitles J. Shirley (1593-1666) to be remembered as something besides the latest and the most fertile of this group of dramatists, have less direct bearing upon the general character of the tragic art of the period. The common features of the romantic tragedy of this age are sufficiently marked, but not capable of obscuring the distinctive features in its individual writers which it is the highest function of criticism to discover and establish.

In comedy, on the other hand, the genius and the insight of Jonson pointed the way to a steady and legitimate advance. His theory of "humours" (which found the most palpable expression in two of his earliest plays*), if translated into the ordinary language of dramatic art, signifies the paramount importance in the comic drama of the creation of distinctive human types. In the actual creation of these it was impossible that Jonson should excel Shakespeare; but in the consciousness with which he recognized and indicated the highest sphere of a comic dramatist's labours, he rendered to the drama a direct service which Shakespeare had left unperformed. By the rest of his contemporaries and his successors, some of whom (such as Brome) were content avowedly to follow in his footsteps, Jonson was only occasionally rivalled in individual

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Comedy.

Ben Jonson.
instances of comic creations; in the entirety of its achievements its genius as a comic dramatist remained unapproached. The favourite types of Jonsonian comedy, to which Dekker, J. Marston (1575/6-1624), Chapman had, though to no large extent, added others of their own, were elaborated with incessant zeal and remarkable effect by their contemporaries and successors. It was after a very different fashion from that in which the Roman comedians reiterated the ordinary types of the New Attic comedy, that the inexhaustible source of T. Middleton (1574-1624), the buoyant productivity of Fletcher, the observant humour of N. Field (c. 1590-c. 1640), and the artistic versatility of Shirley—not to mention many later and lesser names—mirrored in innumerable pictures of contemporary life the undying fancies and follies of mankind. As comedians of manners more than one of these surpassed the old master, not indeed in distinctness and correctness, the fruits of the most painstaking genius that ever fitted a learned sock to the living realities of life,—but in a lightness which did not impair their essential merit, while in the construction of plots the access of abundant new materials, and the greater elasticity in treatment which is the result of accumulated experience, enabled them to maintain a steady progress. Thus our comic dramatic literature from Jonson to Shirley is unsurpassed as a comedy of manners, while as a comedy of character at least it does compare with any other national literary growth preceding or contemporaneous with it. Though the younger generation, of which W. Cartwright (1611 or 1615-1643) may be taken as an example, was unequal in originality or force to its predecessors, yet so little exhausted was the vitality of the species, that its traditions survived the interregnum of the Revolution, and connected themselves in some measure with later growths of English comedy.

The rivals against which in its closing period the old English drama had to contend have already noticed. From the masks and triumphs at court and at the houses of the nobility, with their Olympusses and Parnassuses built by Inigo Jones, and filled with goddesses and nymphs clad in the gorgeous costumes designed by his inventive hand, to the city pageants and shows by land and water,—from the tilts and tournaments at Whitehall to the more philosophical devices at the Inns of Court and the academical plays at the universities,—down even to the brief but thrilling theatrical exentiments of Bartholomew Fair and the "Ninevithical motions" of the puppets,—in all these ways the sections of the theatrical public were tempted aside. Foreign performers—French and Spanish actors, and even French actresses—paid visits to London. But the national drama held its ground. The art of acting maintained itself at least on the level to which it had been brought by Shakespeare's associates and contemporaries, Burbage and Heminge, Alleyne, Lewin, Taylor, and others "of the older sort." The profession of actor came to be more generally than of old separated from that of playwright, though they were still (as in the case of Field) occasionally combined. But this rather led to an increased respect in actors who valued the dignity of their own profession and whose co-operation the authors learnt to esteem as of independent significance. The stage was purged from the barbarism of the old school of clowns. Women's parts were still acted by boys, many of whom attained to considerable celebrity; and a practice was thus continued which placed the English theatre at a considerable disadvantage as compared with the Spanish (where it never obtained), and which probably to some extent reacted upon the licence of expression assumed by our dramatists. The arrangement of the stage, which followed a rapid succession of scenes without any necessity for them being organically connected with one another, remained essentially the same as in Shakespeare's days, though the primitive expedients for indicating locality had begun to be occasionally exchanged for scenery more or less appropriate to the place of action. Costume was apparently cultivated with much greater care, and there is no reason to suppose that the English stage of this period had not gone so far as was expedient in a direction in which in feebler times so vast an amount of effort has come to be spent. The drama still depended in the main upon its literary essentials and upon the actor's art; but the system of prologues and epilogues, and of dedications to published plays, was more uniformly employed than it had been by Shakespeare as the conventional method of recommending authors and actors to the favour of individual patrons, and to that of their chief patron, the public.

Up to the outbreak of the Civil War the drama in all its forms continued to enjoy the favour or good-will of the court, although a close supervision was exercised over all attempts to make the stage the vehicle of political references or allusions. The regular official agent of this supervision was the Master of the Revels, but under James I, a special ordinance, in harmony with the king's ideas concerning the dignity of the throne, was passed "against representing any modern Christian king in plays on the stage." The theatre could hardly expect to be allowed a liberty of speech in reference to matters of state confined to the public at large; and occasional attempts to indulge in the freedom of criticism dear to the spirit of comedy met with more or less decisive repression and punishment. But the sympathies of the dramatists were so entirely on the side of the court, that the real difficulties against which the theatre had to contend came from a directly opposite quarter. With the growth of Puritanism the feeling of hostility to the stage increased in a large part of the population, well represented by the civic authorities of the capital. This hostility found many ways of expressing itself. The attempts to suppress the Blackfriars theatre (1619, 1631, 1633) proved abortive; but the representation of stage plays continued to be prohibited on Sundays, and during the prevalence of the plague in London in 1637 was temporarily suspended altogether. The desire of the Puritans for the more pronounced type openly aimed at a permanent closing of the theatres. The war between them and the dramatists was accordingly of a life-and-death kind. On the one hand, the drama hesitated its uttermost and often coarsely attacks upon whatever aspect of the Puritan spirit—gibes, taunts, caricatures in ridicule and aspersion of Puritans and Puritanism made up a great part of the comic literature of the later Elizabethan drama and of its aftergrowth in the reigns of the first two Stuarts. This feeling of hostility, to which Shakespeare was no stranger, though he could not be connected with the authorship of one of its earliest and coarsest expressions, rose into a spirit of open defiance in some of the masterpieces of Ben Jonson; the comedies of his contemporaries and successors abound in caricatured reproductions of the more common or more extravagant types of Puritan life. On the other hand, the moral defects, the looseness of tone, the mockery of ties and consanguinity, the denial of the dignity of the throne, was passed "against representing any modern Christian king in plays on the stage." The theatre could hardly expect to be allowed a liberty of speech in reference to matters of state confined to the public at large; and occasional attempts to indulge in the freedom of criticism dear to the spirit of comedy met with more or less decisive repression and punishment.

The drama and Puritanism.
the theatres. of the age, intensified the Puritan opposition to all and any stage plays. A patient endeavor to reform instead of supplanting the drama was not to be looked for from such adversaries, should they ever possess the means of carrying out their views; and so soon as Puritanism should victoriously assert itself in the state, the stage was doomed. Among the attacks directed against it in its earlier stages was the famous spillovers of drama's 'Dufty Mathe' (1652), while it involved its author in shamefully cruel persecution, did not remain wholly without effect upon the tone of the dramatic literature of the subsequent period, but the quarel between Puritanism and the theatre was too old and too deep to end in any but one way, so soon as the latter was deprived of its protectors. The Civil War began in August 1642; and early in the following month was published the Ordinance of the Lords and Commons, which, after a brief and solemn preamble, commanded "that while these sad causes and set-times of humiliation do continue, public stage plays shall cease and be forbidden." Many actors and playwrights followed the fortunes of the royal cause in the field; some may have gone into a more or less voluntary exile; upon those who lingered on in the familiar haunts the hand of power lay heavy; and though there seems reason to believe that dramatic entertainments of one kind or another continued to be occasionally presented, stringent ordinances gave summary powers to magistrates against any players found engaged in such proceedings (1647), and bade them treat all stage-players as rogues, and pull down all stage galleries, seats, and boxes (1648).

A few dramatic works were published in this period; while at fairs about the country were acted farces called "drolls," consisting of the most vulgar scenes to be found in popular plays. Thus, the life of the drama was not absolutely extinguished; and its darkest day proved briefer than perhaps either its predecessor or successor. It may here be noticed, that the fortunes of the Irish theatre in general followed those of the English, of course it was merely a branch. Of native dramatic compositions in earlier times not a trace remains in Ireland; and the drama was introduced into that country as an English exotica—apparently already in the reign of Henry VIII., and more largely in that of Elizabeth. The first theatre in Dublin was built in 1635; but in 1641 it was closed, and even after the Restoration the Irish stage continued in a precarious condition till near the end of the century.

Already "in Oliver's time" private performances took place from time to time at noblemen's houses and (though not undisturbed) in the old haunts of the drama, the Red Bull. In 1656 the ingenuity of Sir William Davenant (1606-1669), whose name, though not otherwise eminently in our dramatic literature, is memorable as connecting together two distinct periods in it, ventured on a bolder step in the production of a quasi-dramatic entertainment "of declamation and music;" and in the following year he brought out with scenery and music a piece which was afterwards in an enlarged form acted and printed as the first part of his opera, The Siege of Rhodes. This entertainment he afterwards removed from the private house where it had been produced to the Cockpit, where he soon ventured upon the performance of regular plays written by himself. Thus, under the cover of two sister arts, whose aid was in the sequel to prove by no means altogether beneficial to its progress, the English drama had boldly anticipated the Restoration, and was no longer hiding its head when that much desired event was actually brought about. Soon after Charles II.'s entry into London, two theatrical companies are known to have been acting in the capital. For these companies patents were soon granted, under the names of "the Duke (of York's)" and "the King's Servants," to Davenant and one of the brothers Killigrew respectively,—the former from 1662 acting at Lincoln's Inn Fields, then at Dorset Garden in Salisbury Court, the latter from 1663 at the Theatre Royal near Drury Lane. These companies were united from 1682, a royal licence being granted in 1685 to a rival company which performed in Lincoln's Inn Fields, which migrated to Covent Garden in 1733. Meanwhile Vanbrugh had in 1705 built the theatre in the Haymarket; and a theatre in Goodman's Fields—afterwards rendered famous by the first appearance of Garrick—led a fitful existence from 1729 to 1737. The Act of 1737 revived the Crown of the power of licensing any more theatres; so that the history of the English stage for a long period was confined to a limited area. The rule which prevailed after the Restoration, that neither of the rival companies should ever attempt a play produced by the other, operated beneficially both upon dramatic perfection and upon the progress of the art of acting, which was not exposed to the full effects of that deplorable spirit of personal rivalry which leads actors, in order to outshine their fellows, to attempt parts for which they often have no special qualification. There can be little doubt that the actor's art has rarely flourished more in England than in the days of T. Betterton (1635-1710) and his contemporaries, among whose names those of Hart, Mohun, Kynaiston, Nokes, Mrs Barry, Mrs Betterton, Mrs Dragegirdle, and Mrs Eleanor Gwynne have, together with many others, survived in various connections among the memories of the Restoration stage. No higher praise had ever been given to an actor than that which Addison bestowed upon Betterton, in describing his performance of Othello as a proof that Shakespeare could not have written the most striking passages of the character otherwise than he has done.

Owing in part to the influence of the French theatre, Tragedy, which by this time had taken the place of the Spanish as the ruling drama of Europe, the separation between tragedy and comedy is clearly marked in our post-Restoration plays. Comic scenes are still occasionally introduced into tragedies by some of our dramatists who adhered more closely to the Elizabethan models (such as Otway and Crowne), but the practice fell into disuse; while the endeavour to elevate comedy by pathetic scenes and motives is one of the characteristic marks of the beginning of another period in our dramatic literature. The successive phases through which English tragedy passed in the later Stuart times cannot be here discussed, as they are another subject of the dramatic plan, which is offered by the theories put forth by some of the dramatists in support of their practice is often delusive. Following the example of Corneille, Dryden and his contemporaries
and successors were fond of proclaiming their adherence to this or that principle of dramatic construction or form, and of upholding, with much show of dialectical acumen, maxims derived by them from French or other sources, or elaborated with modifications and variations of their own, but usually amounting to little more than what Scott calls "certain romantic whimsical imitations of the dramatic art." The student of the drama will find much both to entertain and to instruct him in these prefaces, apologies, dialogues, and treatises; he will acknowledge that Dryden's incomparable vigour does not desert him either in the exposing or in the upholding of fallacies; and that even Byrom, usually regarded as having touched the nadir of dramatic criticism, is not wholly without grains of salt. But Restoration tragedy itself must not be studied by the light of Restoration criticism. So long as any dramatic power remained in our tragic poets—and it is absent from none of the chief among them from Dryden to Rowe—the struggle between fashion (disguised as theory) and instinct (tending in the direction of the Elizabethan traditions) could never wholly determine itself in favour of the former.

Lord Orrery (1652-1679), in his "Essay on Tragedy," claims for English tragedy the "abstract art" of such it professed to be. This new species of tragedy, for such it professed to be, borrowed from France that garb of rhyme which the "romans de longue haleine" of the Scudéry and their contemporaries—and by French plays treating similar themes. It likewise borrowed from France that garb of rhyme which the English drama had so long abandoned, and which now reappeared in the heroic couplet. But the themes which to readers of novels might seem of their nature inexhaustible could not long suffice to satisfy the more capricious appetite of theatrical audiences; and, for the form, in the application it was sought to enforce for it, was doomed to remain an exotic. In conjunction with his brother-in-law Sir R. Howard (1626-1698), and afterwards more confidently, by himself, Dryden (1631-1699) threw the incomparable vigour and brilliancy of his genius into the scale, which soon rose to the full height of fashionable popularity. At first he claimed for English tragedy the right to combine her native inheritance of freedom with these valuable foreign acquisitions. Nor was he dismayed by the ridicule which the celebrated burlesque (by the duke of Buckingham and others) of "The Rehearsal" (1671) cast upon heroic plays, with such materials for ridicule as the contemporary dramas supplied to its facetious authors, but returned to the defence of a species which he himself was in the end to abandon. The desire for change proved stronger than the love of consistency—which in Dryden was never more than theoretical. After summoning tragedy to rival the freedom (without disdaining the machinery) of opera, he came to recognize in characterization the truest secret of the master-spirit of the Elizabethan drama, and, after audaciously but not altogether unhappily essaying to rival Shakespeare on his own ground, produced under the influence of the same views at least one work of striking merit. But he was already growing weary of the stage itself as well as of the rhymed heroic drama, and though he put an end to the species to which he had given temporary vitality, he failed effectively to point the way to a more legitimate development of English tragedy.
The English comic writers often succeeded in achieving a special brilliance without at the same time adding coarseness to their art. They were capable of portraying the most virulent and the most honest passion in a manner which seemed legitimate to be made upon their stage. Writers like John Dryden, whose comedies are among the most successful of his age, have done so. But while they excelled in the comic style, they never wholly abandoned its prerogative, were, it must be confessed, the best of the age in this respect. The English comedy of the Restoration, like the rest of its literature, was characterized by a great deal of this found in the stage. The English comic writers often succeeded in achieving a special brilliance without at the same time adding coarseness to their art. They were capable of portraying the most virulent and the most honest passion in a manner which seemed legitimate to be made upon their stage. Writers like John Dryden, whose comedies are among the most successful of his age, have done so. But while they excelled in the comic style, they never wholly abandoned its prerogative, were, it must be confessed, the best of the age in this respect. The English comedy of the Restoration, like the rest of its literature, was characterized by a great deal of this found in the stage.
wards to so large an extent became dissociated. But the
demands of the stage and those of its patrons and of
the public of the "Augustan" age, and of that which succeeded it,
were not, in general, fast bound by the trammels of a taste with
which a revival of the poetic drama remained irremediable during a long period of our literature. There is
reason to conclude that the art of acting progressed in the
same direction of artificiality, and stiffened into apparently
immovable forms in such actors as Macklin and Quin. The
genius of Garrick, whose theatrical career extended from
1741 to 1776, opened a new era in his art. His unequalled
success was due in the first instance to his incomparable
natural gifts; but these were indisputably enhanced by a
careful and continued literary training, and enabled by a
purpose which prompted him to carry the noblest, as
he was capable of performing the most various, range of
English theatrical characters. By devoting himself as actor
and manager with special zeal to the production of Shake-
speare, Garrick permanently popularized on the national
stage the greatest creations of our dramas, and indirectly
helped to seal the doom of the surviving tendency to main-
tain in most ambitious walks of our dramatic literature
the nerveless traditions of the pseudo-classical school.
A generation of celebrated actors and actresses, many of whom
live for us in the dramatic epigrams of Churchill's Roscoe
(1761), were his helpmates or his rivals, but their fame
has paled, while his is destined to endure as that of one of
the typical masters of his art.

Decline of tragedy.

The contrast between the tragedy of the 18th century and
these plays of Shakespeare and one or two other
Elizabetians which already before Garrick were known to the
English stage, was indeed weakened by the mutated
form in which these generally, if not always, made their appearance there. Even so, however, there are perhaps
few instances in theatrical history in which so strange
a competition was so long sustained. In the hands of the
tragic poets of the age of Pope, as well as of that
of Johnson, tragedy had hopelessly stiffened into the forms of
its accepted French models. Direct reproductions of these
continued, as in the case of Ambrose Philips's (c. 1671-
1749) and Charles Johnson's (1769-1748) translations from Racine, and Aaron Hill's (1685-1750) from Voltaire.
Among other tragic dramatists of the earlier part of the
century may be mentioned J. Hughes (1677-1720), who,
while assisting Addison in his Cato, produced at least one
praiseworthy tragedy of his own,1 E. Fenton
(1683-1730), a joint translator of "Popes Homer" and
the author of one extremely successful drama,2 and L. Theobald
(d. 1744), the first hero of the Dunciad, who,
besides translations of Greek dramas, produced a few more
or less original plays, one of which he was daring enough to
father upon Shakespeare.3 A more distinguished name is that of J. Thomson (1700-1748), whose unlucky
Sophonisba and subsequent tragedies are, however, barely
remembered by the side of his poems. The literary
genius of E. Young (1681-1765), on the other hand,
posessed vigour and variety enough to distinguish his
talents from the ordinary level of Augustan plays; in
one of them he seems to challenge comparison in the treat-
ment of his theme with a very different rival,4 but by his
main characteristics as a dramatist he belongs to the school of his contemporaries. The endeavours of G. Lillo
(1693-
1739) to bring the lessons of tragedy home to his fellow-citizens were destined to exercise a powerful influence upon
the early progress of the German dramas, and not to remain
without significance for the history of our own; but his pedestrian muse failed in the end to satisfy higher
artistic demands than those met in his most popular

1 The Siege of Rhodes. 2 Horace. 3 The Double Falsehood. 4 The Beggar's Opera.

Play,5 and broke down in the attempt to carry the
Theatres into the regions of domestic tragedy 6 "Classical" tragedy in the generation of Johnson pursuing
the even tenor of its way, the dictator himself treading
with solemn footfall in the accustomed path,7 and Mason
(1725-1757) making the futile attempt to produce a complete imitation of Greek models. The best-remembered tragedy
of the century, Homo's Douglas (1757), was the production of
an author whose famous kinsman, David Hume, had
advised him "to read Shakespeare, but to get Racine and
Voltaire by heart." The indisputable merits of the play
cannot blind us to the fact that Douglas is the child of
Merope.

While thus no high creative talent arose to revive the English
poetic genius of English tragedy, comedy, which had to
have a
content against the same rivals, naturally met the demands of the conflict with greater buoyancy. The history of the
most memorable of those rival forms no part of this
sketch (see Music), but the points of contact between its
progresses and the history of our dramatic literature cannot
be altogether left out of sight. If Purcell's (1658-1695)
endeavours to unite English music to the words of Greek
poets were now a thing of the past, the isolated efforts of
Addison8 and others to recover the operatic stage for the
national tongue had proved powerless. Italian texts, which
had first made their entrance piecemeal, in the end asserted
themselves in their entirety; and the German genius in
tragedy was due in the first instance to his high
artistic demands. But as the operatic stage was preserved
by Handel (c. 1735-c. 1797) making the
attempt to produce a close

5 George Borrow. 6 The Fatal Curiosity (Act iv.). 7 Irene (1749).
8 The Beggar's Opera. 9 Love in a Village, &c. 10 The Waterman, &c.
afterwards to suggest to him the theme of the first of the novels which have made his name immortal, accordingly
written in two days (though we should call them those days) upon a larger admixture of political with
literary and other satire. A third attempt\(^2\) (which never reached the stage) furnished the offended
minister, Sir Robert Walpole, with the desired occasion for placing a curb upon the licence of the theatre, such as had already
been advocated by 4 representative of its old civic
adversaries. The famous Act of 1737 asserted no
new principle, but converted into legal power the customary
authority hitherto exercised by the Lord Chamberlain (to
whom it had descended from the Master of the Revels).
The regular censorship which this Act established has not
appreciably affected the literary progress of the English
drama, and the objections which have been raised against it
seem on candid consideration untenable. The liberty of
the stage is a question differing in its conditions from
that of the liberty of speech in general, or even from that of
the liberty of the press; and occasional lapses of official
judgment weigh lightly in the balance against the obvious
advantages of a system which in a free country needs only
the vigilance of public opinion to prevent its abuse. The
policy of the restraint which the Act of 1737 put upon
the number of playhouses is different, but has long
been obsolete, partly suggested by Goethe's
little comedy in the latter half of the
18th century.

The Licensing Act.

Comedy in

the demands of dramatic compositions; his
successes have habitually consulted.

The decline of dramatic composition of the higher class,
the history in the English theatre about the English
beginning of the 19th century, is attributed by Scott to the
weakening out of the French model that had been so long
wrought upon; while, as he points out, the new impulse
which was sought in the dramatic literature of Germany
was derived from some of its worst, instead of from its
noblest, productions—from Kotszabu rather than from
Lessing, Schiller, and Goethe. But the change which was
coming over English literature was in truth of a wider and
deeper nature than it was possible for even one of its chief
representatives to perceive. As that literature freed itself
from the fetters so long worn by it as indispensable
ornaments, and threw aside the veil which had so long
obscured both the full glory of its past and the lofty
capabilities of its future, it could not resort except tenta-
tively to a form which like the dramatic is bound by a
hundred bonds to the life of the age itself. Soon, the poems
with which Scott and Byron, and the unrivalled prose fictions with
which Scott both satisfied and stimulated the imaginative
demands of the public, diverted the attention of the
literary public from the more refined comedy, which was
unable to escape, with the light foot of verse or prose fiction, into
"the new, the romantic land." New themes, new ideas,
in the formation of a new generation of writers and
readers; nor did the drama readily lend itself as a
vehicle of new dramatic attempts betraying a more or less wilful ignorance of the
requirements of dramatic composition; his
beautiful Masque, partly suggested by Goethe's Faust, and his powerful
Comedy, have in fact the form of plays; his tragedies
on Italian historical subjects show some resemblance in their
political rhetoric to the contemporary works of
Allieri; his Werner is a hastily-dramatized sensation
novel. To Coleridge (1772–1834), who gave to English
literature a fine though inaccurate translation of Schiller's
Willestain, the same poet's Roberis (to which Wordsworth's
only dramatic attempt, the Borderers, is likewise
indebted) had probably suggested the subject of his tragedy of
Olario, afterwards acted under the title of Remorse. Far

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\(^{1}\) Pope's _The Historical Register for 1736._

\(^{2}\) The Golden Drum.

\(^{3}\) Townley, _High Life Below Stairs_ (1759).

\(^{4}\) The Mason: _Taste, The Author, &c._

\(^{5}\) The School for Lovers.

\(^{6}\) The Jealous Wife; _The Clandestine Marriage._

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\(^{7}\) The Heavens.

\(^{8}\) The Bold's Stratagem: _A Bold Stroke for a Husband._

\(^{9}\) The School for Lovers.

\(^{10}\) John Bull, _The River at Law._

\(^{11}\) Midas; _The Golden Drum._
superior to this is his later drama of Zophoim, a genuine homage to Shakespeare, out of the themes of two of whose plays it is gracefully woven. Scott, who in his earlier days had translated Goethe's \textit{Gute von Berlichingen}, gained no reputation by his own dramatic compositions. W. S. Landor (1775–1864), apart from those \textit{Imaginary Conversations} upon which he best loved to expend powers of observation and characterization such as have been given to few dramatists, cast in a formally dramatic mould studies of character of which the value is far from being confined to their wealth in beauties of detail. Of these the magnificent, but to construction altogether undramatic, \textit{Count Julian} is the most noteworthy. Shelley's (1792–1822) \textit{The Cenci}, on the other hand, is not only a poem of great beauty, but a drama of true power, abnormally revolting in its theme, but singularly pure and delicate in treatment. A humbler niche in the temple of our dramatic literature belongs to some of the plays of C. R. Maturin\footnote{Bentham.} (1782–1824), Sir T. N. Talfourd\footnote{Thom.} (1795–1854), and Dean Milman\footnote{Paxton.} (1791–1866). Divorced, except for moments, from the stage, English dramatic literature in its higher forms can in the present century no longer be regarded as a connected national growth, though it would be rash to deny that with the isolated efforts of individual poets future developments may connect themselves. Among living poets Sir H. Taylor has perhaps approached nearest to the objective spirit and the fullness of style of the Elizabethan drama; R. H. Horne survives as a worthy representative of the modern Romantic school; Matthew Arnold has the dignity of form of his classic models, \textit{Longfellow the graceful facility of a mellow literary culture}; while R. Browning's insight into the secrets of human character and A. C. Swinburne's gift of passionate poetic speech, are true dramatic qualities. By his \textit{Hansard J. Nichol} has likewise made a noteworthy contribution to the higher literature of our drama. The latest English dramatic poet is Tennyson, whose homage to the national form of the historic drama may be hopefully interpreted as a promise of the future possibly awaiting it. Far greater is the number of those English writers of the present century who, while seeking to preserve a connection between the demands of the stage and their dramatic productions, have addressed themselves to the theatrical rather than the literary public—since such a distinction must needs be drawn. The respect paid by her contemporaries to the modestly \textit{simple} and judiciously concentrated efforts of Mrs Joanna Baillie (1795–1854) entitles her to remembrance in the annals of literature as well as those of the stage; but it would be going too far to make a similar exception in favour of the plays of Sheridan Knowles (1784–1862) or of the late Lord Lytton (1806–1873). At the present day the theatre commands the services of many authors of talent, a few of whose most successful productions may be destined to survive the age which gave birth to them. But here, if anywhere, the task of selection must be left to time.

The history of the English stage in the present century has been one of gradual decline and decay, not (especially at the present day) without prospects of recovery, of which a praiseworthy hopefulness is ever willing to make the most. At the beginning of the century the greatest tragic actress of the English theatre, Mrs Siddons, had passed away; and before its second decade had closed, not only she (1812), but her brother John Kemble (1817), the representative of a grand style of acting upon which the present generation would hardly dare to look, had withdrawn from the boards. Mrs Siddons was soon followed into retirement by her successor Miss O'Neill (1819); while Kemble's brilliant later rival, Edmund Kean, as actor the intimations of whose genius seem to have supplied, so far as intuition ever can supply, the absence of a steady self-culture, remained on the stage till his death in 1833. Young, Macready, and others handed down some of the traditions of the older school of acting to the very few who remain to suggest its resemblance to the living generation. But even these—among whom a tribute of gratitude is especially due to Helen Faucit and S. Phelps—are now lost (or all but last) as active members to the theatre, and they have left no school behind them. The comic stage has been fortunate in anammer aftergrowth, from generation to generation, of the successors of the old actors who live for us in the reminiscences of Charles Lamb; nor are the links all snapped which bind the humours of the present to those of the past. It is least of all in any spirit of depreciation that the efforts of the actors of our day, in any branch of the art, should be discussed. But it is right to point out that these efforts are carried on under conditions of a partly novel character, to which the actors are forced to submit. No art stands in greater need of the help of training,—an advantage with which the modern English actor is virtually obliged to dispense. No art stands in greater need of the relief of change in the subjects of its exercise,—but the modern English actor is made to look forward, as to the height of success, to playing the same character for three hundred nights. No art stands in greater need of the guidance of criticism,—but the modern English actor is too often left to criticise himself. Finally, none stands in greater need of the protection of self-respect,—but there are few theatres in England which are not from time to time degraded in deference to tastes which in earlier days not Puritan censors only would have called by a simpler name.

The reaction against the theatre, which set in with the spread of the religious movement at the close of the last century, had the natural effect of lowering instead of raising its tone and manners, as well as those of the literature designed to supply its immediate demands. With the growth of that enlightenment which is inseparable from tolerance, this reaction seems to be passing, and an effort to counter-reaction; while on the other hand, a larger section of the educated classes have begun to take an interest in the progress of the national drama, and the world of fashion is descending to follow the impulse. Dramatic criticism, too—a branch of English literature to which from the days of Steele to those of Hazlitt so many writers of mark were ready to devote their efforts, but which had more recently often fallen into hands either unequal to the task or disdainful of it—seems here and there awakening to a sense of its higher duties. But all this will not permanently recover the stage for its higher tasks, or reunite to it a living dramatic literature, unless an object of serious moment for the future of the nation is pursued in a serious spirit, and unless it is thought worth while to devise means suited to this end. In a word, so long as there is no national theatre which, removed above the conditions of a commercial speculation, can cultivate the art to which it is dedicated for the sake of that art itself, the future of the English drama will be at the mercy of the likings of London, and of the adoption of those likings by the London which is not London, and by the "provinces," as in theatrical matters they are only too appropriately called. The time may come when it will be recognized that the progress and culture of a people depend on its diversions as well as upon its occupations, and that the interests of a national art are not unworthy the solicitude of thoughtful statesmen.
The enduring influence. Among the foreign actors of England who flitted through the innumerable courts of the Banter and novelty, and Duke Henry Julius of Brunswick-Luneburg. The history of the German drama differs widely from that of our own, though a close contact is observable between them at an early point, and again at relatively recent points, in their annals. The dramatic literature of Germany, though in its beginnings intimately connected with the great national movement of the Reformation, soon devoted its efforts to a sterile imitation of foreign models, while the popular stage, persistently sitting itself to a robust but gross taste, likewise largely due to the influence of foreign examples, seemed destined to a hopeless decay. The literary and the acted drama were thus estranged from one another during a period of extraordinary length; nor was it till the middle of the 18th century that, with the opening of a more hopeful era for the life and literature of the nation, the reunion of dramatic literature and the stage began to accomplish itself. Before the end of the same century the progress of the German drama in its turn began to influence that of other nations, and by the widely comprehensive character of its literature, as well as by the activity of its stage, to invite a steadily increasing interest.

Towards the close of the Middle Ages, as has been seen, dramatic performances had in Germany as in England largely fallen into the hands of the civic guilds, and the composition of plays was more especially cultivated by the master-singers of Nuremberg and other towns. Thus, while the scholars of the German Renaissance, who so largely became the agents of the Reformation, eagerly dramatized, both in the Latin and the native tongue, the narratives of the Bible, and sought to suit the scholastic drama to the demands of the times (P. Rehnn, a prolegomen of Luther, standing foremost among those religious dramatists), it was under the influence of the Reformation also, and of the impulse given by Luther and others to the use of High German as the popular literary tongue, that Hans Sachs, the immortal shoemaker of Nuremberg, seemed destined to become the father of the popular German drama. In his plays, "spiritual," "secular," and "Fastnachtspiele" alike, the interest indeed lies in the dialogue rather than in the action, nor do they display any attempt at development of character. In their subjects, whether derived from Scripture, or from popular legend and fiction, there is no novelty, and in their treatment no originality. But the healthy vigour and fresh humour of this marvellously fertile author, and his innate sympathy with the views and sentiments of the burgher class to which he belonged, were elements of genuine promise—a promise which the event was signal to disappoint. Though the manner of Hans Sachs found a few followers, and is recognizable in the German popular drama even of the beginning of the 17th century, the literature of the Reformation, of which his works may claim to form part, was soon absorbed in labours of a very different kind. The stage, after admitting novelties introduced from Italy or (under Jesuit supervision) from Spain, was subjected to another and enduring influence. As the foreign nations who flitted through the innumerable courts of the empire, or found a temporary home there, special prominence was acquired, towards the close of the 16th and in the early years of the 17th century, by the "English comedians," who appeared at Cassel, Wolfenbuttel, Berlin, Dresden, Cologne, etc. Through these players a number of early English dramas found their way into Germany, where they were performed in more or less imperfect versions, and called forth imitations by native authors. Duke Henry Julius of Brunswick-Luneburg and Jacob Ayres (a citizen of Nuremberg, where he died, 1808) represent the endeavours of the early German drama to suit its still uncouth forms to themes suggested by English examples; and in their works, and in those of contemporary playwrights, reappears no small part of what we may conclude to have been the "English comedians" characteristic. The converse influence of German themes brought home with them by the English actors, or set in motion by their strolling ubiquity, cannot have been equal in extent, though Shakespeare himself may have derived the idea of one of his plots from such a source. But though welcome to both princes and people, the exertions of these foreign comedians, and of the native imitators who soon arose in the earliest professional companies of actors known in Germany, instead of bringing about a union between the stage and literature, led to a directly opposite result. The popularity of these strollers was owing partly to the (very real) blood and other horrors with which their performances were deluged, partly to the buffoons which theyseasoned, and the various tricks and feats with which they diversified them. The representatives of the English clowns had learnt much on their way from their brethren in the Netherlands, where in the period the art of grotesque acting greatly flourished. Nor were the sides of other arts neglected,—to this day in Germany professors of the "equestrian drama" are known by the popular appellation of "English riders." From these true descendents of the mimes, then, the professional actors in Germany inherited a variety of tricks and traditions; and soon the favourite figures of the popular comic stage became conventional, and were stereotyped by the use of masks. Among these, an acknowledged supremacy was acquired by the native Hans Wurst (Jack Pudding)—of whose name Luther disapproved the invention, and who is known already to Hans Sachs—the privileged buffoon, and for a long series of generations the real lord and master of the German stage. If that stage, with its grossness and ribaldry, seemed likely to become permanently estranged from the tastes and sympathies of the educated classes, the fault was by no means entirely its own and that of its patron the populace. The times were evil times for a national effort of any kind; and poetical literature was in all its branches passing into the hands of scholars who were often pedants, and whose language was a jargon of learned affectations. Thus things continued, till the awful visitation of the Thirty Years' War cast a general blight upon the nation, and the traditions of the popular theatre were left to the guardianship of the marionettes ("Puppenspiele").

When, in the midst of that war, German poets once more began to essay the dramatic form, the national drama was left outside their range of vision. M. Opitz (1597-1639), who holds an honoured place in the history of the German language and literature, in this branch of his labours contented himself with translations of classical dramas and of Italian pastorales—among the latter is Daphne, with which the history of the opera in Germany begins. A. Gryphius (1616-1664), though as a comic dramatist lacking neither vigour nor variety, and acquainted with Shakespearean as well as Latin and Italian examples, chiefly devoted himself to the imitation of Latin, earlier French, and Dutch tragedy, the rhetorical dialogue of which he effectually reproduced in the Alexandreine metre. Neither the turgid dramas of D. C. von Lohenstein (1665-1684), for whose Cleopatra the honour of having been the first German tragedy has been attributed, nor the essays of H. E. von Breuning (1616-1684), in which the "Triumphant" of tragedy in Germany is seen, can be said to have so much as longed for a native dramatic art.
recently claimed, nor even the healthier comedies of Chr. Weise (1642–1708) were brought upon the stage; while the religious plays of J. Klay (1616–1656) are mere recitations connected with the Italian growth of the oratorio. The figural allegories commemorating of contemporary events, with which the learned from time to time supplied the theatre, and the pastoral dramas with which the didactic poets of Nuremberg—"the shepherds of the Pegnitz"—after the close of the war gratified the pious longings of their fellow-citizens, were alike mere scholastic efforts. These indeed continued in the universities and gymnasium to keep alive the love of both dramatic composition and dramatic representation, and to encourage the theatrical taste which led so many students into the professional companies. But neither these dramatic exercises nor the fable-Creates in which the Jesuits at Vienna revived the pomp and pageantry, and the mixture of classical and Christian symbolism, of the Italian Renaissance, had any influence upon the progress of the popular drama.

The history of the German stage remains to about the second half of the 16th century one of the most melancholy, as it is in way one of the most instructive, chapters of theatrical history. Ignored by the world of letters, the actors in return deliberately sought to emmanate their art from all dependence upon literary material. In composition reigned supreme, not only in farce, where Hans Wurst, with the aid of Italian examples, never ceased to charm his public, but in the serious drama likewise (in which, however, he also played his part) in those Haupt- und Staatsaktionen (high-matter-of-state-dramas), the plots of which were taken from the old stores of the English comedians, from the religious drama and its sources, and from the profane history of all times. The hero of this period is "Magister" J. Velthen, who at the head of a company of players for a time entered the service of the Saxon court, and by producing comedies of Mohlere and other writers sought to restrain the licence which he had himself carried beyond all earlier precedent, but who had to fall back into the old ways and the old life. His career exhibits the climax of the efforts of the art of acting to stand alone; after his death (c. 1693) chaos ensued. The strolling companies, which now included actresses, continued to foster the popular love of the stage, and even under its most degraded form to uphold its national character against the rivalry of the opera, and that of the Italian commedia dell'arte. From the latter was borrowed Harlequin, with whom the drama was blended, and who became a standing figure in every kind of popular play. He established his rule more especially at Vienna, where from about 1712 the first permanent German theatre was maintained. But for the actors in general there was little permanence, and amidst mazes of all sorts, and under the growing ban of clerical intolerance, the popular stage seemed destined to hopeless decay.

The first endeavours to reform what had thus apparently passed beyond all reach of recovery were neither wholly nor generally successful; but this does not diminish the honour due to two names which should never be mentioned without respect in connection with the history of the drama. Friederica Caroline Neuber's (1650–1760) biography is the story of a long-continued effort which, notwithstanding errors and weaknesses, and though, so far as her personal fortunes were concerned, it ended in failure, may almost be described as heroic. As director of a company of actors which from 1727 had its headquarters at Leipzig (hence the new school of acting is called the Leipzig school), she resolved to put an end to the formlessness of the existing stage, to separate tragedy from comedy, and to extinguish Harlequin. In this endeavour she was supported by the Leipzig professor J. Chr. Gottsched, who induced her to establish French tragedy and comedy as the sole models of the regular drama. Literature and the stage thus for the first time joined hands, and no temporary muschance or personal misunderstanding can obscure the enduring significance of the union. Not only were the abuses of a century swept away from a representative theatre, but a large number of literary works, designed for the stage, were produced on it. It is true that they were but versions or imitations from the French (or in the case of Gottsched's Dying Cato from the French and English), and that at the moment of the regeneration of the German drama new letters were thus imposed upon it, and upon the art of acting at the same time. But the impulse had been given, and the beginning made. On the one hand men of letters began to subject their dramatic compositions to the test of performance, the tragedies and comedies of J. E. Schlegel (1778–1749), the artificial and sentimental comedies of Chr. F. Gottsched (1715–1769) and others, together with the vigorous popular comedies of the Danish dramatist Holberg, were brought into competition with translations from the French.

On the other hand, the Leipzic school exercised a continuous effect upon the progress of the art of acting, and before long the Garrick of Germany, C. Eckhof (1729–

1778), began a career, outwardly far humbler than that of the great English actor, but which made his art a fit subject for the critical study of scholars, and his profession one for the equal esteem of honourable men.

Among the authors contributing to Mme. Neuber's Lessing, the Leipzig school had been a young student destined to complete, after a very different fashion and with very different aims, the work which she and Gottsched had begun. The critical genius of G. E. Lessing (1729–1781) is peerless in its comprehensiveness, as in its keenness and depth, but if there was any branch of literature and which by study and practice he made pre-eminently his own, it was that of the drama. As bearing upon the progress of the German theatre, his services to its literature, both critical and creative, can only be described as unmeasurable. The Hamburgische Dramaturgie, a series of criticisms of plays and (in its earlier numbers) of actors, was undertaken in furtherance of the attempt to establish at Hamburg the first national German theatre (1767–9). This alone would invest these papers with a high significance; for though the theatrical enterprise proved abortive, yet it established the principle upon which the future of the German theatre was to be based. For the drama the immediate theatrical public is no sufficient court of appeal. But the direct effect of the Dramaturgie was to complete the task Lessing had in previous writings begun, and to overthrow the dominion of the arbitrary French rules and the French models established by Gottsched. Lessing vindicated its real laws to the drama, made clear the difference between the Greeks and their would-be representatives, and established the claims of Shakespeare as the modern master of both tragedy and comedy. His own dramatic productivity was constant, tentative, progressive. His first step was, by his Miss Sara Sampson (1755), to oppose the realism of the English domestic drama to the artificiality of the accepted French models, in the forms of which Chr. F. Weissa (1726–1804) was seeking to treat the subjects of Shakespearean plays. Then, in his Mina von Barnheim (1767) he offered a national comedy drawn from real life, and appealing to patriotic sentiments as well as to broad human sympathies, written in prose (like Miss Sara Sampson), but in form holding a judicious mean between French and English examples.

The note sounded by the critics of Lessing met with a
The Sturm und Drang

but the permanent effect of Gots was to have crushed with an iron hand the last remnants of theatrical conventionality (those of costume and scenery included), and to have extinguished with them the lingering respect for rules and traditions of dramatic composition which even Lessing had treated with consideration. Its highest significance, however, lies in its having been the first great dramatic work of a great national post, and having definitely associated the national drama with the poetic glories of the national literature.

Thus in the classical period of that literature, of which Goethe and Schiller were the ruling stars, the drama had a full share of the loftiest of its achievements. Of these, the dramatic works of Goethe vary so widely in form and character, and connect themselves so intimately with the different phases of the development of his own self determined poetic genius, that it was impossible for any of them to become the starting-points of any general growths in the history of the German drama. His way of composition was, moreover, so peculiar to himself—conception often preceding execution by many years, part being added to part under the influence of new sentiments and ideas and views of art, flexibly followed by changes of form—that the history of his dramatic works, which furnished the text for so many of Lessing's criticisms, helps to mark an epoch in German literature. Under the influence of Shakespeare, or of their conceptions of his genius, arose a youthful group of writers who, while worshipping their idol as the representative of nature, displayed but slight anxiety to harmonize their imitations of form with the demands of art. The notorious Ungolini of H. W. von Gerstenberg (1737-1823) seemed a premonitory sign that the coming flood might make a circular motion back to the extravaganzas and horrors of the old popular stage; and it was with a sense of this danger in prospect that Lessing in his third important work, his comedy Brutus (1779), furnished the text for an instance of his poetic and personal biography. His Clavigo and Stella, which succeeded Gots, are domestic dramas in prose; but neither by these, nor by the series of charming pastoral operas which he composed for the Weimar court, could any influence be exercised upon the progress of the national drama. In the first conception of his Faust, he had indeed sought the suggestion of his theme partly in popular legend, partly in a domestic motive familiar to the authors of the Sturm und Drang (the story of Gotschen); the later additions to the First Part, and the Second Part generally, are the results of metaphysical and critical studies and meditations belonging to wholly different spheres of thought and experience. The dramatic unity of the whole is thus, at the most, external only; and the standard of judgment to be applied to this wondrous poem is not one of dramatic criticism. Egmont, originally designed as a companion to Gots, was not completed till many years later; there are few dramas more effective in part, but the idea of a historic play is lost in the elaboration of the most graceful of love episodes. In Iphigenias and Tasso, Goethe exhibited the perfection of form of which his classical period had enabled him to acquire the mastery; but the sphere of the action of the former (perfect though it is as a dramatic action), and the nature of that of the latter, are equally remote from the demands of the popular stage. Schiller's genius, unlike Goethe's, was naturally Schiller's, and consistently suited to the claims of the theatre. His juvenile works, The Robbers, Fiesco, Kabale und Liebe (Intrigue and Love), vibrating under the influence of an age of social revolution, mingled in their prose form the truthful expression of passion with no small element of extravaganzas. But with true insight into the demands of his art, and with unequaled single-mindedness and self-devotion to it, Schiller gradually emancipated himself from his earlier style; and with his earliest tragedy in verse, Don Carlos, the first period of his dramatic authorship ends, and the promise of the second announces itself. The works which belong to this—from the Wallenstein trilogy to Tell—are the acknowledged master-pieces of the German poetic drama, treating historic themes reconstructed by conscious dramatic workmanship, and clothing their dialogue in a noble vestment of rhetorical verse. In one of these, The Bride of Lambsin, Schiller attempted a new use of the chorus of Greek tragedy; but the endeavour was a splendid error, and destined to exercise no lasting effect.

Schiller's later dramas gradually conquered the stage,
The popular stage.

Over which his juvenile works had triumphantly passed,
but on which his Don Carlos had met with a cold welcome.
For a long time, however, its favourites were authors of
a very different order, who suited themselves to the demands
of a public little concerned with the literary progress of the
age. Poetic and other popular tastes had oscillated between
the imitators of Guts and those of Emstia Galotti, they
entered into a more settled phase as the establishment of
standing theatres at the courts and in the large towns
increased the demand for good "acting" plays. Famous
actors, such as Schröder and A. W. Linnel (1759-1814),
sought by translations or compositions of their own to
meet the popular hings, which largely took the direction of
drama. The national drama (especially in its mixed and
comic national drama, but its species) from the
and time ranged from the school and other literary
astonishing, and it seems announced as authentically
an introduction to the dramatic
Institut.-A. von Kotzebue (1761-1819). His productivity
ranged from the domestic drama and comedy of all kinds to
theatrical attempts to rival Schiller and Shakespeare in verse;
and though his popularity (which ultimately proved his doom)
became upon him the bitterest attacks of the Romantic
school and other literary authorities, his self-conceit is not
astonishing, and it seems to say that there is some
exaggeration in the contempt which has been lavished upon
him by posterity. Nor should it be forgotten that German
literature had hitherto failed to furnish the comic stage
with any successors to Minna von Barnhelm, for Goethe's
efforts to dramatize characteristic events or figures of the
Revolutionary age must be dismissed as failures, not from
a theatrical point of view only. The joint efforts of Goethe
and Schiller for the Weimar stage, important in many respects
for the history of the German drama, at the same
time reveal the want of a national dramatic literature
sufficient to supply the needs of a theatre endeavouring to
satisfy the demands of art.

Meanwhile the so-called Romantic school of German
literature was likewise beginning to extend its labours to
original dramatic composition. From the universality of
sympathies proclaimed by this school, to whose leaders
Germany owed its classical translation of Shakespeare,4
and an introduction to the dramatic literatures of so many ages
and nations,5 a variety of new dramatic impulses might be
expected; while much might be hoped for the future of
the national drama (especially in its mixed and comic
species) from the alliance between poetry and real life
which they preached, and which some of them sought
personally to exemplify. But in practice universality pre-
pared itself as peculiarity or even as eccentricity; and in
the end the divorce between poetry and real life was
announced as authoritatively as their union had been.
Outside this school, the youthful talent of Th. Klopfer
(1791-1813), whose early promise as a dramatist5 might
perhaps have ripened into a fulness enabling him not
unwarily to occupy the seat left vacant by his father's
friend Schiller, was extinguished by a patriotic death.
The efforts of M. von Collin (1776-1823) in the direction of the
historical drama remained isolated attempts. But of the
leaders of the Romantic school, A. W. (1767-1845) and
F. von Schlegel (1772-1829), contented themselves with
frigid classicallities; and L. Tieck (1772-1855), in the
strange alchemy of his Phaenix, melted legend and fairy-
tale, novel and drama,6 poetry and satire, into a compound,
easily indeed, but hardly in its entirety, or in many of its parts, to any but the literary mind.

F. de la Motte-

Fouquè (1777-1843) infused a spirit of poetry into the
chivalry drama. Clemens Brentano (1777-1842) was a later
fantastic dramatist unsuited to the stage. Here a feeble
dramatist outgrowth of the romanticists, the "destroy dramatists"
Z. Werner (1766-1823), A. Mullner (1774-1829), and C. E.
N. Hovinhus (1776-1845), achieved a temporary
success; and it was with an attempt in the same direction11 that
the Austrian dramatist F. Grillparzer (1791-1871) began his
long career. He is assured what he pronounced himself to be, the foremost of the later dramatic poets of Germany,
unless that tribute be paid to the genius of H. von Kleist
(1776-1811), who in his short life produced besides other
works a romantic drama12 and a rustic comedy13 of genuine
merit, and an historical tragedy of angular originality and
power.14 Grillparzer's long series of plays includes poetic
dramas on classical themes15 and historical subjects from
Austrian history.16 The Romantic school, which through
Tieck had satirized the drama of the bourgeois and its
offshoots, was in its turn satirized by A. Count von Platen-
Hallermeijer's (1796-1853) admirable imitations of Aristophanec
comedy. Among the objects of his banter were the
popular play-wright E. Raupach, and K. Immermann (1796-
1840), a true poet, who, however, less generally remembered
as a dramatist F. Hebbel18 (1813-1863) is justly
ranked high among the foremost later dramatic poets of his
country, few of whom equal him in intensity. Other names of
literary mark are those of Chr. D. Grabbe (1801-1836),
J. Mosen (1803-1867), O. Ludwig (1813-1865), and "F.
Halm" (1806-1871), and, among living writers, K. Gutzkow,
G. Freytag, and H. Laube. The last of these names recalls
The in one of its most noteworthy examples the long continued
German stage of the present day.

These efforts have not been confined to fostering the art of acting in a succession of eminent re-
presentatives, among whom the sons of L. Devrient
in various ways acquired a reputation worthy of their name,
and B. Dawison was accounted the equal of the most brilli-
ant of the brotherhood, or to maintaining as intimate a
relation as possible between the stage and literature.
Happily contrasting with other countries by the number
and variety of its centres of intellectual life—rivals in
artistie effort even where political or social rivalry is out of
the question—Germany has not only cherished its own
national drama, but with a catholicity of taste, aided by
the powers of a language admirably adapted for trans-
literation, has opened its theatres to the dramatic master-
pieces of other nations also, and more especially of our
own. The German theatre has its weak points, and has
not maintained itself wholly free from vicious influences;
but upon the whole its efforts are on a level with the
demands of the national culture, and in harmony with
the breadth and variety of the national intelligence. No
other stage furnishes the same opportunities for the
study of dramatic literature

With this summary of the history of the German drama
it is necessary to close this survey. To be even nominally
complete, it would have had to take into account the
fortunes of more than one other modern European drama.
Dutch Among these the Dutch is interesting both in its beginnings,

1 Der Deischen (Chivalrous); Der Bergemann.
2 K. von Schlegel and Tieck's (1797-1835).
3 A. W. S., Lectures on Dramatic Art and Literature, Ec.
4 Eronde, Ec.
5 Altena.
6 Einst Deutschen: Der Giebelstein Kaiser (Pass in the Roof), Ec.
which resemble those of the German—the influence of the so-called chambers of the redkyners (rhetoricians), from the early years of the 16th century onwards, reposing that of the master-sangers of contemporary Germany. The earliest of their efforts, which so effectively tempered the despotism of both church and state, seem to have been of a dramatic kind; and a manifold variety of allegories, moralities, and other entertainments (examenmata, dramas, and faticies or farces) enhanced the attractions of those popular pageants in which the Netherlands surpassed all other countries of the North. The art of acting flourished in the Low Countries even during the troubles of the great revolt; but the birth of the regular drama was delayed till the advent of quieter times. Dutch dramatic literature begins, under the influence of the classical studies cherished in the seats of learning founded before and after the close of the war, with the classical tragedies of S. Koster (c. 1585–1650). The romantic dramas and farces of Gerbrand Bredero and the tragedies of Hooff belong to the same period; but his foremost dramatic poet was J. van den Vondel (1587–1679), who from an imitation of classical models passed to more original forms of dramatic composition, including a patriotic play and a dramatic treatise of part of what was to form the theme of Paradise Lost. But Vondel had no successor of equal mark. The older form of Dutch tragedy—in which the chorus still appeared—was, especially under the influence of the critic A. Fels, exchanged for a close imitation of the French models, Cornelle and Racine; nor was the attempt to create a national comedy successful. Thus no national Dutch drama was permanently called into being. Still more decidedly the dramatic literature of the Scandinavian peoples springs from foreign growths; but Denmark, where the beginnings of the drama in the plays of the schoolmaster Chr. Hansen recall the mixture of religious and farcical elements in contemporary German efforts, at a later date produced a comic dramatist of thorough originality and of a wholly national cast. L. Holberg (1654–1754), one of the most noteworthy comic poets of modern literature, not only marks an epoch in the dramatic literature of his native land, but he contributed to overthrow the trivialities of the German stage in its worst period, which he satirized with merciless humour, and set an example, never surpassed, of a series of comedies deriving their types from popular life and ridiculing with  

Scandinavian drama.

Dramsburg, a town of Prussia, at the head of a circle in the government of Koaln, about fifty miles east of Stettin. It occupies both banks of the River Drage, a tributary of the Oder, and is inclosed by walls and defended by a fort, containing a hospital and various administrative offices, and carries on cotton and woollen weaving, tanning, brewing, and distilling. Population at the end of December 1875, 6525.

Drammen, a town in the amt of Buserud, in Norway, is situated at the northern end of the Drammen fjord, a western arm of Christiania fjord, at the mouth of the Dramslev. It consists of the three places Brangnas or Bragernas, Stromso, and the port Tangen, the first on the north, and the other two on the south side of the river. The greater part of the town has been rebuilt since the confinimations of 1668 and 1870. The principal industrial establishments are oil, cotton, and tobacco factories, breweries, arsenals, gun foundries, and an active trade in wood, pitch, and iron is carried on. The population at the end of December 1875 was 18,838.

Draughts, a game of unknown origin. Some consider it to be a very old game, but Strutt (Sports and Pastimes) calls it a "modern invention." It is not mentioned in the older editions of the Académie des Jeux, nor in the Complect Gamester, so, if an old game, it was not formerly an important one. As early as 1668 M. Mallet published a treatise on draughts, at Paris, and the game was played in Europe at least a century earlier. The Romans played a similar game called latrunculi, the men moving diagonally, capturing by leaping over, and obtaining superior power when they arrived at the furthest row of squares. The board, however, consisted of only sixteen squares. It is believed that sorki among the Greeks was a similar game with a central space "called the sacred barrier," and representations of a kind of draught game are frequently found on the monuments of the ancient Egyptians (Wilkinson).

Draughts is played by two persons. A board (see diagram) is required, and twenty-four men—twelve white
DRAUGHTS

and twelve black—which at starting are disposed on the board as in the diagram. Either the white or black squares may be played on (the latter being now more usual). If the black squares are used the board must be placed with a black square in the left hand corner; if the white squares are used, it is placed as in diagram.

The game is played by moving a man, one square at a time, along the diagonal to the right or left. Thus a man placed on square 13 in diagram can move to 15 or 14. Each player moves alternately, the first move being decided by lot.

As soon as a man is moved on the square adjacent to an opponent's man, and there is an unoccupied square beyond, the unprotected man may be captured and removed from the board. Thus, if there is a white man on square 18, and a black man on square 14, square 14 being vacant, and white having to move, he jumps over 14 and remains on square 9, and the man on 14 is taken up.

If two or more men are so placed that one square intervenes between them they may all be taken at one move. Thus if white having to move has a man on 26, and black man on 25, 18, and 10, the intermediate squares and square 6 being vacant, white could move from 26 to 6, and take the men on 25, 18, and 10. In making such a move with a man, all the steps must be forward, that is, in the direction away from the player, just as in making simple moves and captures.

It is compulsory to take if able. If a player has a man en prise, and makes a move that does not capture, his adversary may allow the move to stand, without penalty, or he may have the move retracted and compel the player to take, or he may allow the move to stand and remove the man that neglected to capture from the board (called huffing). "Huff and move" go together, i.e., the player who huffs then makes his move. The huff must be made before the move. If the adversary of the player who fails to capture allows the move to stand, without huffing, and the player who can capture moves again without taking, the adversary again has the options he had before. If a player can take one man in one place and more than one in another, he may take in which place he pleases, not being obliged to capture the larger number of men. But if he elects to take the larger number, he must take all of that lot that are en prise, or he may be huffed from where he stands when he has taken a portion of the men, or he may be compelled to take the remainder, or the incomplete move may be allowed to stand.

As soon as a man reaches one of the squares furthest from his side of the board, e.g., when a white man (see diagram) reaches square 1, 2, 3, or 4, or a black man square 29, 30, 31, or 32, he is crowned by placing one of the captured men of his own colour on him, and becomes a king. A king has the additional power of moving and taking backwards, i.e., toward his own side of the table, as well as forwards. But on becoming a king the move ends, notwithstanding that there may be an adverse man en prise. Thus if there are black men on squares 7 and 6, a white one on 9, and squares 2 and 11 are unoccupied, white having to move takes the man on square 6 and becomes a king; but he cannot take the man on square 9 at the same move. A king can be huffed for not taking, the same as a man, with the exception just pointed out.

The game proceeds until one of the players has all his men and kings taken, or has all those left on the board blocked, so that he has no more left. If it should so happen that neither of the players has sufficient advantage in force or position to enable him to win, the game is drawn. The player having the stronger force may be required to win in forty moves (e., forty or exchange), computed from the move on which notice was given; if he fail, the game is drawn.

The game of draughts has been exhausted, i.e., the reply to every possible move is known by all proficient, and as there is no advantage in moving first, every game ought to end in a draw. Under these circumstances rules for playing are of but little use, the only way to become a player is to study the analyses laid down in works on the subject, and to know them by heart. For beginners, however, it may be stated that men should as a rule be played to the middle of the board rather than to the sides, as in the middle the man attacks two squares, at the side only one. It is good play to push for a king early in the game. Also, as soon as a player has any advantage in force, he should exchange whenever he can. When the forces are equal the position of having the move should be striving for.

To have the move means to occupy such a position as to be able to secure the last move. For example, place kings of opposite colours at 19 and 12. If the king at 12 is next to move, the king at 19 has the move and must win; but if the king at 12 is next to move, the other king has the move and the game must be drawn. Having the move does not always win. Thus at the beginning of a game the second player has the move, but at this stage it is of no use to him. When a player is in a cramped position it is often disadvantageous to have the move.

In order to ascertain who has the move, divide the squares into two systems of four columns each, the columns of one system being those which commence with the numbers 29, 30, 31, and 32 (see diagram), and end with the numbers 5, 6, 7, and 8, the remainder being the columns of the other system. Add together all the men and kings which stand in either system, and if their sum is odd the next player has the move, if even the last player has the move. For example, white has men or kings at squares 26 and 32, black at 23 and 19. There are three pieces on the white system and one on the black, and since the odd, white is the next player he has the move. An exchange generally, but not always, changes the move; so, when about to exchange, the player should prefer an exchange that will keep the move, or, not having it, an exchange that will gain it. To discover whether an exchange will change the move add together all the capturing pieces in both systems, and if they are odd and the captured pieces are also odd, the move is not changed by an exchange; the same rule applies if they are both even; but if one is even and the other odd, an exchange changes the move.

The laws of draughts used in match play are Anderson's, but so few matches at draughts are played that there is scarcely any demand for them, and they are out of print. Omitting those which relate only to match play, the following is an abridgment of Anderson's laws.

1. In a series of games the players take the white and black men alternately. Black has the first move, whether the previous game was won or drawn.

2. A player whose turn it is to play touching a man must move it, except he gives notice of adjusting the man, if it cannot be moved, he loses the game.

3. If a man is moved over an angle of the square on which it is stationed, the move must be completed in that direction.

4. The game is abandoned when the move is not made, or the move is made without a piece, or a piece is moved without a piece, or a piece is moved in the wrong direction, or a piece is not moved which could have been moved.
5. If a player who has the option of huffing touches the man he is entitled to remove, he must huff. 6. A false move loses the game.

7. If a player captures one of his own men by error, the adversary may replace or not. 8. When more than one man can be taken at one move, the player must not remove his hand from the capturing man until he has taken all he can; if he does so the move is completed, and he is liable to be huffed. 9. When a player pushes a man to king, his adversary is bound to crown it. 10. Each player must move within a specified time (the time is generally three, five, or ten minutes by previous agreement, unless there is only one way of taking or pass move on the board, when only two minutes are as a rule allowed). 11. The player having the stronger force may have notice given him to win in forty moves; when two kings remain against one, in twenty moves. When the odds of the draw are given, and he still continues to take, he must do so until he wins in twenty moves.

Polish Draughts was formerly played on a board of a hundred squares with forty men; but it is now more frequently played with an ordinary draughts-board and men, the men being placed at starting as at draughts. The man move and take at draughts, except that in capturing they move either forwards or backwards like a draught king. A man arriving at a crowning square becomes a queen, and has the move of a bishop at chess. In her capture she takes any unguarded man or queen in any unoccupied space she chooses of the same diagonal, beyond the piece taken. But if there is another unguarded man she is bound to choose the diagonal on which it can be taken. For example, place a queen on square 19, and advance a man at squares 22, 16, 24, 14. The queen is bound to move from 29 to 11, 20, 27, and having made the captures to remain at 9 or 5, whichever she prefers.

The capturing queen or man must take all the adverse pieces that are en prise, or that become so by the uncovering of any square that the capturing piece has been removed during the capture, e.g., white queen at square 7, black at squares 10, 18, 19, 22, and 27, the queen captures at 10, 23, 27, and 19, and the piece at 22 being now removed, she must go to 15, take the man at 18, and stay at 22, 25, or 29. In consequence of the intracity of some of these moves, it is the rule to remove every captured piece as it is taken.

If a man arrives at a crowning square when taking, and he can still continue to take, he must do so, and not stay on the crowning square as at draughts. Passing a crowning square in taking does not entitle him to be made a queen.

In capturing, the player must choose the direction by which he can take the greatest number of men or queens, or he may be huffed. Numerical power is the criterion, e.g., three men must be taken in preference to two queens, if the numbers are equal and one force comprises more queens than the other, the player may take whichever lot he chooses.

A single queen against three queens can draw. If one player has a queen and man, and the other three queens, the best play is to sacrifice the man, as the draw is more certain with the queen alone.

When two men of one colour are played on a diagonal with one vacant square between them (e.g., at squares 16 and 23), the position is called a lunette. If the adversary enters the lunette he must capture one of the pieces which compose it. Before entering a lunette it is advisable to calculate what the position will be after a capture, as the position sometimes intentionally or accidentally removes the one man.


**DRAWING.** Although the verb to draw has various derivations, the substantive drawing is confined by usage to that of design, and is treated as if it were a synonym of design. The word comes from the Latin *traire,* or from a hundred Gothic word, so that traction and drawing are nearly related, and preserve still the same meaning when applied to the work of animals or machines, as we say that a traction engine draws so many tons. Another form of the same word is draw, the strong low vehicle used by brewers and carriers. It may be worth while to inquire what is the connection between the idea of a draw horse and that of a drawing master.

The primitive idea, which is the common origin of both, is that of moving something in that very direction, of which the term "draught" is the first. A horse draws the plough; but a carpenter does not draw his plane, he pushes it; and we should say that a locomotive draws a train when the train is in front, and not when it was behind. The idea of design is preserved in the fine arts. We do not usually say, or think, that a sculptor is drawing when he is using his chisel, although he may be expressing or defining forms, nor that an engraver is drawing when he is pushing the point of the needle through the metal; although the result may be the rendering of a design. But we do say that an artist is drawing when he uses the lead pencil, and here we have a motion bearing some resemblance to that of the horse or engine. The fingers of the artist draw the pencil on the paper, and the same idea is preserved in the fine arts. We do not usually say, or think, that a sculptor is drawing when he is using his chisel, although he may be expressing or defining forms, nor that an engraver is drawing when he is pushing the point of the needle through the metal; although the result may be the rendering of a design. But we do say that an artist is drawing when he uses the lead pencil, and here we have a motion bearing some resemblance to that of the horse or engine. The fingers of the artist draw the pencil on the paper, and here we have a very close analogy with artistic drawing.

The poles are drawn on the ground as a pencil is on paper, and the same analogy may be observed between two of the French words in which the French verb *tirer* is frequently employed. The verb is not derived from *traire,* but may be ultimately traced, like our own verb to tear, to the Ionic stem "tirare." It was formerly used by good writers in the two senses of our verb to draw. Thus Lafontaine says, "Six forts chevaux tirent un coche," and Casiloba wrote, "Il n'y a pas longtemps que je me suis fait tirer par Rigaud," meaning that Rigaud had drawn or painted his portrait.

At the present day the verb *tirer* has fallen into disuse amongst cultivated Englishmen with regard to the drawing and painting, but it is still universally used for all kinds of design and even for photography by the common people. The cultivated use it still for printing, as for example "cette gravure sera tirée à cent exemplaires," but here rather in the sense of pulling than of drawing.

A verb much more nearly related to the English verb to *draw* is *traire,* which has *traire* for its past participle. It is used to draw, and is so little altered as to be scarcely even a corruption of the original Latin form. *Traire* is now used exclusively for milking cows and other animals, and the analogy between this and artistic drawing is not obvious at first, nevertheless there is a certain analogy of motion, the hand passing down the teat draws the milk downwards. The word *trait* is much more familiar in connection with art as "les traits du visage," the natural markings of the face, and it is very often used in a figurative sense, as we say "traits of character." It is quite familiar in portrait, derived from *protraiter.*

The ancient Romans used words which expressed more definitively precisely the meaning which drawing was done in line (delineare) or in shade (adumbarere), though there are reasons for believing that the words were often indiscriminately applied. Although the modern Italians have
DRAWING

both tracés and tracres, they are delineare stil in the sense of
artistic drawing, and also adnemare.

The Greek γραφή is familiar to the English reader in "graphic" and in many compounds, such as photograph, etc. It is worth observing that the Greeks seem to have considered drawing and writing as essentially the same process, since they used the word for both.

This points to the early identity of the two arts when drawing was a kind of writing, and when such writing as men had learned to practise was essentially what we should call drawing, though of a rude and simple kind. "The origin of the hieroglyphs of Egypt," says Dr Wilson (Pre-Historic Man, chap. xviii.), "is clearly traceable to the simplest form of picture-writing, the literal figuring of the objects designed to be expressed. Through a natural series of progressive stages this infantile art developed itself into a phonetic alphabet, the arbitrary symbols of sounds of the human voice." Even in the present day picture writing is not unfrequently resorted to by travellers as a means of making themselves intelligible. There is also a kind of art which is writing in the modern sense and drawing at the same time, such as the work of the medieval illuminators in their manuscripts.

The mental processes by which man has gradually become able to draw, in our modern sense of the word, may be followed, like the development of a chicken in the egg, by examining specimens at various stages of formation. His first efforts are remarkable for their highly abstract character, because the undeveloped intellect has few and simple ideas, and takes what it perceives in nature without being embarrassed by the rest. It seizez upon facts rather than appearances, and the primitive artist is satisfied when the fact has been clearly stated or conveyed by him. The study of appearances, and the effort to render them, come much later; and the complete knowledge of appearances is the sign of a very high state of civilization, implying most advanced artistic culture both in the artist and in the public to whom he addresses himself. The work of the primitive artist is an affirmation of the realities that he knew without mystery or confusion. In all early Egyptian work you see at once what the artist intended to draw, whereas the finest modern drawing is often so mysterious as to be most obscure to those who have not made a special study of the fine arts. The primitive artist knew that his work was really that of a writer, and as the sign-painter of the present day takes care to make his letters plain in order that they may be read, so the early Egyptian draftsman had no thought of any more delicate truth of appearance that that which sufficed to let people clearly understand what his figures and symbols intended for. There was no conception of what artists call "effect," which enters into the greater part of modern drawing, until a very much later period.

We may mention briefly two survivals of primitive art in our own day, which have for their purpose a high degree of legibility. These are coats-of-arms and trade-marks. Heraldic drawing, when properly done, is executed on primitive principles, and is a survival of the earliest uses of graphic art, being really a kind of writing intended to be recognizable by the illustrator when they saw it on shield or banner. Modern trade-marks, of which the use has greatly extended of late years, are of the same class, and are often designed with a simplicity of intention like that of primitive art.

Archæic forms of drawing are thus not all extinct even in our own day, and certain arts are practised among us which compel the modern mind to recover by effort and study something of that simplicity and decision which were inherent in earlier ages. Pottery-making, illuminating, and designing for pottery are often rightly practised in these days in an archaic spirit. In some of the best modern caricatures there are peculiarities which belong to early symbolic drawing, in which, as Dr Wilson says, "the figures are for the most part grotesque and monstrous from the very necessity of giving predominance to the special feature in which the symbol is embodied."

The first idea of drawing is always delineation, the delimiting marking out of the subject by lines, the notion of drawing from without lines being of later development. In primitive work the outline is hard and firm, but interior markings are given also. When the outline was complete, the primitive artist would proceed at once in many cases to fill up the space inclosed by it with flat colour, but he did not understand light and shade and gradation. The historical development of drawing may always be seen in the practice of children when left to draw for their amusement. They begin, as the human race began, with firm outlines, representing men and animals, usually in profile. The next thing they do, if left to their own instincts, is to fill up the spaces so marked out with colour, the brightest they can get. This is genuine primitive art.

By referring to the earliest kind of drawing we perceive how drawing may exist without certain elements which in modern times are usually associated with it. We generally conceive of drawing in close association with perspective, and at least with some degree of light and shade, but it may exist independently of both. Thus may perhaps help us to a definition of drawing. Such a definition would need to be exceedingly comprehensive, or else it would certainly exclude some of the many arts into which drawing more or less visibly enters. A modern critic would be very likely to say that a figure was deficient in drawing if it was deficient in perspective, and yet the two are easily separable, as for example in the work of the mechanical draftsman; or drawing may be associated with a kind of perspective which is usually false, as isometric perspective. We might say that drawing was the imitation of form, but a moment's reflection would enable us to perceive that it may create forms without imitating, as it does in many fanciful conceptions of ornamental designers. It might be suggested that drawing was the representation on a flat surface of forms which are not flat, but the most variously curved surfaces, as in the case of the fine arts. The primitive artist knew that his work was really that of a writer, and as the sign-painter of the present day takes care to make his letters plain in order that they may be read, so the early Egyptian draftsman had no thought of any more delicate truth of appearance that that which sufficed to let people clearly understand what his figures and symbols intended for. There was no conception of what artists call "effect," which enters into the greater part of modern drawing, until a very much later period.

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expression of certain customary ways of seeing things which were not intended traditionally by art, so that the artists in their turn became the means of imposing the authority of public sentiment upon their successors. The liberty of individual artists, even to draw what may seem such a simple thing as the outline of a human figure, is dependent upon the degree in which the civilization under which they live is not traditional.

To understand the effect of customary ways of seeing things on the use of pure line in drawing, the reader is recommended to study some specimens of early design as it was practiced in China, in Japan, in Egypt, in Assyria, and in Greece. It is easy, in these days, to procure photographic reproductions of ancient design when the student does not live near a museum. He will perceive at once in the five countries four entirely different ways of seeing and designing the curvature of lines, although the Chinese and Japanese ways are nearer to each other than they are to the Egyptian or the Greek; whilst on the other hand, different as the two latter may be, they are nearer to each other than to the art of China or Japan.

A certain kind of curvature is dominant in Chinese art, along with the preference for certain easily recognizable forms. In Japanese drawings the curves are wilder, bolder, more unexpected, more audacious; and when the Japanese designer chose to make use of angles he was, from the same tendency to vivacity and exaggeration, disposed to prefer acute angles. In both Chinese and Japanese work, when at its best, there is often the most exquisite beauty and delicacy of line, especially in the contours of female faces; and there is frequently a masterly power in the interpretation of natural truth, or certain portions of natural truth, by means of this utmost simplicity.

In ancient Egypt the line was quieter and less "tormented" than in China or Japan, the curvature more restrained, and the artistic expression generally rather that of calm dignity than of vigorous action. Egyptian art was kept within the strictest limits by the most powerful conventionalism that ever existed, but the student of drawing will find much in it that is well worth his attention. The Egyptian draftsmen attained to a most noble use of line, combining a serious and disciplined reserve with much delicacy of modulation. The true grandeur of Egyptian work has only been apprehended of late years, because it was formerly supposed that its conventionalism was due to simple ignorance of nature and want of skill in art. It is of various degrees of excellence, and there were inferior artists in the early Egyptian schools, as in others; but we are often startled by magnificent power in conventionalizing natural material, and by a peculiar sense of beauty. There is in Egyptian design a singular combination of tranquil strength with refinement.

Assyrian design is very familiar to us through the ancient wall-sculptures, where the line is often rather engraved than curved, so that we can see quite plainly what were the qualities of drawing which the Assyrian artists valued. They, too, conventionalized nature, but sought for those curves and accents of line which express mainly beauty rather than feminine. They drew, in their own way, admirably well, with great firmness and self-command, knowing always exactly what equivalents or representatives to give for the lines and markings of nature, in accordance with the spirit of their artistic system. Their art is much more strongly accented than the Egyptian, and we might even say that it is more picturesque while it is less tranquil. Assyrian design has more of the spirit of painting than Egyptian, and less of the spirit of sculpture. The Assyrian line tends to the expression of energy in action, the Egyptian to strength and beauty in repose.

Notwithstanding the high degree of power and skill attained in linear design by nations which existed before the artistic development of Greece, it must ever remain an inexorable marvel that the Greek designers should have attained, apparently without effort and simply by the gift of nature, to a degree of perfection in the use of line which had never been approached before and has never been equalled since. The manly beauty of an Assyrian king at a lion hunt, with his curly beard and his muscular legs, and his arm mighty to bend the bow, is grand indeed, but with a purely barbaric grandeur; the half-feminine beauty of an Egyptian deity lives chiefly in the serene face—the body is often frankly architectural, and has always rather the qualities of a column than those of the living flesh. But in Greece the curves of the line were for the first time made to express the fulness and grace of life, with an ideal perfection coming from the exquisite innate taste and refinement of the artists, and never to be found in any single mode. How much knowledge and taste may be expressed by a simple line may be seen in any Greek vase of the best time, especially if there are both draped and naked figures, of both sexes, in the composition.

The leading principle of Greek design on vases was the Greek expression of form by pure, firm, and accurate line. Spaces were distinguished by flat tints of red, black, and white, but there was no shading to indicate modelling. When local colour could be easily hinted at by markings of black thicker than a simple outline, it was frequently done, as it was continually in Japanese art, but care was taken that these broader black markings should never be important enough to alter the true character of the design, as essentially a work in simple line. Thus, a woman's hair might be drawn with broad touches to make us see that it was darker than her flesh, and the dark band round the edges of her dress would be given in pure black of its own width. Nor was this the only device by which a certain degree of local colour was suggested to the eye, though it was not really imitated. The red did for ordinary flesh colour, and white for flesh-colour intended to be of more than ordinary fairness. Great spaces of black were reserved for the background, by which a striking relief was given to the figures. This is the regular principle of Greek vase decoration, though the artists did not strictly confine themselves to it, but would also work in simple black and white, as in the Portland vase, or introduce brighter colour sparingly, like the turquoise of the mantle of the Venus of Camirus. This use of colour, however, did not in the least interfere with the unfinishing system of Greek drawing, which was, in the strictest sense of the word, delineation. In this it differs absolutely from many modern kinds of drawing which avoid the line as much as the Greeks delighted in it. This is not intended as an expression either of praise or blame; it is simply a statement of fact. The truth is that Greek line-drawing is simply the most searching and most perfect condition of a very early form of art. It is the child's idea of drawing, carried out with the knowledge and taste of men who lived in the early youth of the human race and were not disturbed and distracted by the discoveries and experiments of modern Europeans. Amongst its other peculiarities may be mentioned its beautiful independence of anatomy. No anatomical markings are ever given simply as such. The figures are living men and women with their skins on, not doré «kés in a dissecting room. There is less of the anatomical tendency in Greek art than in Assyrian. When the Assyrian artist wishes to make you feel that a man's leg is very strong, he shows every muscle and tendon as far as his knowledge will allow, but the Greek contented himself with showing the vigour and ease of the strong man's action. It is, however, in
the representation of the female form that the grace of the Greek line-drawing is most conspicuous and most unprecedented. There had been some little feminine grace of motion even in Egyptian art, but it is stiffness and awkwardness themselves in comparison with it Greek.

The right progress of art-education in modern times could not be better assured than by following in the case of each individual student that course of development which humanity itself has followed. True and careful lines, in combination with the colouring of spaces in a few flat tints, are the natural beginning. What a child does with infantile unsassured for its amusement the beginner in serious art should be taught to do carefully and well for his instruction. The accurate use of line is the first thing to be learned with the pencil point, and the equal laying of a flat tint is the first thing to be learned with the brush.

Even at so early a stage in art as the use of the simple line, we find ourselves face to face with one of the most severe peculiarities of the fine as distinguished from the mechanical arts. It does not require much critical acumen to discover that accuracy is one thing in a line and beauty another. The student ought to work at first for accuracy, but from beautiful works of art which are not in themselves accurate copies of nature but copies idealized at least in some degree by the taste and feeling of the artist. All works of art that are worth studying are ideal in one way or another. We have spoken of the Greek line, which is one of the most highly idealized of all artistic expressions. The Greek artist when they outlined an object always greatly simplified the outline by omitting many minor accidents of angle and curvature which a modern picturesque artist would seek for because of their variety. But simplification does not explain all that the Greek mind did to alter nature in its sense of beauty and elegance, and corrected what was awkward. All this could be done, and was done, with the simple line alone without any help from chiaroscuro, and it is one of the most remarkable proofs of the expressional power of the line that it even suggests modelling in the blank spaces which are included by it.

Notwithstanding the excellence of Greek linear design it would be well that the student's attention should not be confined to it too exclusively. For, in the first place, we may remember that the vase-paintings which remain to us were not executed by the most eminent panters living at that time, but were only done by clever workmen in the artistic spirit which the eminent panters had rendered prevalent and fashionable; whereas in modern art we can study the \textit{inassance} line of truly great men, both in their drawings and in many cases more accessible still in their etchings. Again, the Greek designers had certain excellencies, but not all excellences, the remarkably harmonious character of their work being, in fact, quite as much due to its absolute neglect of certain qualities of line as to its possession of other qualities. It is a narrow and limited kind of art, the singular perfection of it being due in great measure to that narrowness. Modern art, on the contrary, is infinitely vast and varied, full of imperfection, abounding in all conceivable kinds of error and failure, but also rich beyond all that a Greek could possibly have imagined in knowledge and sentiment of many kinds.

The Greek spirit passed through its first decadence in Roman art, and was at last degraded past recognition by Byzantium. A new spirit of linear design arose in the northern countries during the Middle Ages, gradually forming what we call the Gothic schools of architecture and ornament. The medieval artists began exactly like the Medieval Greeks by the natural primitive process of line and that drawing, colouring of spaces, of which we have abundant examples in their illuminated manuscripts, and examples less abundant in the mural paintings which remain to us. Students who intend to qualify themselves for decorative work, or for carving, will do well to give earnest attention to medieval designs of ornament which abound in the richest and most fanciful invention; but students of the figure have little to learn from the Middle Ages, for in those centuries the figure was very imperfectly understood. Sometimes we meet with a startling exception, with some instance of individual observation which strikes us because it looks like science; but the plain truth is that the medieval artists of all classes were as inferior to the Greek in the knowledge of the human frame as they were superior to them in the capacity for inventing new and fanciful schemes of decoration. If the student wishes to learn the figure he may therefore pass at once from the period of decline in Greek art to the Renaissance, without concerning himself about the more or less successful attempts of the intervening ages, in which, indeed, may be found examples of quaintly rendered human character, but hardly any of well-studied human form. The best way is to go from antiquity to Hans Holbein the younger at once. He had remarkable power and skill in the use of line, many of his best portraits being hardly anything more than a delicately true outline, with just enough shading to make us understand the modelling, but nothing of what is commonly understood by chiaroscuro. As Holbein was much more of a realist than the Greeks were, his lines have a variety of curvature than theirs, and the forms included by them are more individual. All that is best in the peculiar spirit of northern drawing at that time is to be found in Holbein's art, which is full of close observation, of calm sobriety, and unfailing truthfulness. In the south of Europe the Renaissance led to that artistic development of which the modern schools of figure design have inherited the ideas and principles. A certain period in the life of Raphael marks the transition from the old spirit to the new, and his great success in the application of the new principles led to their authoritative establishment in the schools of Europe. The Renaissance made drawing at the same time more scientific and more ideal. The artists studied anatomy more than it had ever been studied before, and they gave a degree of attention to the whole of the human body which a medieval draftsman would have concentrated almost exclusively on the face. But they did not rest satisfied with copying the facts of nature and investigating the laws of construction and of action,—they took that further step which the Greeks had taken before them, and drew the figure not merely as it appeared to their bodily eyes, but with that more perfect beauty which was suggested to the eye in the artist's mind. Raphael openly affirmed this principle by declaring that he drew men and women, not as they were, but as they ought to be, and the process of idealization may be actually seen in what he did by comparing his studies with his completed works.

We have hitherto spoken simply of the use of line, that being essentially drawing in the strict sense of delineation; but when the European mind had reached the period of the Renaissance a new study took its rise—chiaroscuro— which became so unsexringly mingled with that of drawing that it is impossible to speak adequately of the one without giving some account of the other. The increased knowledge of the muscular structure of the body led the artists to pay more attention to modelling than had ever been paid to it before, so that good modelling got to be considered an essential part of drawing. It may be necessary, for the unstruck in artistic matters to explain in this place...
Modelling that modelling in design is the art of shading in such a manner as to give everything its due degree of projection or relief, and the execution of it lies in the necessity for making the degree of projection in any object or part of an object exactly what it ought to be relatively to other projecting masses or details in the same drawing. The simple line-work of the early stages of art was therefore abandoned by the greatest artists of the Renaissance as a general means of study. Even when using the most rapid means of expression for themselves alone, they were accustomed to treat the outlines with little respect, and always to indicate shading in some way, often by the very rudest means, as for example by a few hasty diagonal strokes of the pen. Leonardo da Vinci retained to the last a good deal of that care about the outline which characterizes the earlier stage of art, but even in his case it was accompanied by an equal degree of care in modelling. In the sketches and studies of Michelangelo the care and time given to the outline are always in exact proportion to the pains taken with the modelling, and this employment of the time at the artist's disposal is a clear proof that he considered modelling as much a part of drawing as the outline itself. When he had time to do the modelling thoroughly, as in his finished studies, he made the outlines very carefully also, but when the time at his disposal was limited he did not economize it by four or four hours of labour.

The work in each instance is economized, not by rejection of one portion of his art, but by summarizing the whole, more or less, with the strictest reference to the time at his disposal. The studies of Raphael are done on the same principle. The spirit of the Renaissance was caught from the study of antiquity, but it gave more latitude to original genius by principle. Expression, and were to it what emphasis is to outline. Itself. When he had time to do the modelling, he pains taken with the modelling, and this employment of the means to the outline are always in

Michelangelo.

Exaggeration. Leonardo da Vinci, being of a calmer temper, put little pains into the outline which characterizes the greatest artists of the Renaissance and in all their strongest successors. The most perfect development of the picturesque spirit in drawing before our own century took place in Holland, the Dutch school working almost entirely in that spirit. The severe spirit has maintained itself chiefly as a sort of academic protest against the picturesque, which is never authoritatively taught in any academy of art. The academies direct students continually to Raphael, but never to Rembrandt. On the other hand, the kind of drawing usually taught to artists is, especially through the medium of water-colour. The strongest reaction against the picturesque has been that of the French "néo-Greeks," who in study went back to the pure Greek line and flat space, the most earnest of them declaring that nothing more was needed to the perfection of art. The most perfect and studied pictures of the fifteenth and sixteenth centuries are the studies of etchers and fumistes (artists who draw in charcoal). The picturesque is always easily recognizable by its love of accident and variety of line and character, and by its strong effects of light and shade. When in excess it violently exaggerates these accidents, varieties, and effects.

The kind of drawing which is best for landscape differs in some important respects from that which is best for the figure. To perceive the full truth of this, the reader has only to draw a landscape with the simplicity of the line in a Greek figure, when he will see that the more complicated character of landscape material requires a more varied interpretation. Good landscape draftsmen are seldom very accurate as to form, and it is not necessary that they should be; but they are always careful to preserve truth of character, and have great difficulties of their own to contend against, which are generally much underestimated. The accuracy of landscape design comes from the necessity for composition. When the figure painter composes, he can move his models about, and place them in different attitudes, and draw them faithfully after all; but when a landscape painter does the same thing, by an effort of imagination, with his mountains, trees, or towers, he unavoidably produces topography. The habit of measurement soon forms itself, for this reason, in all landscape draftsmen who compose; and all artists by profession are compelled to compose in order to make their works attractive in appearance.
The study of drawing is now becoming much more general in Great Britain than it has ever been before. The preliminary difficulties of the art can scarcely be overcome without the assistance of a master, and in his absence the student may obtain useful help from books.

The student should thoroughly master and remember Burnet's Essay on the Education of the Eye, which is most concise, and contains nothing doubtful or disputable. Mr. Harding's works, and Mr. Ruskin's Elements of Drawing, are also useful books for amateurs, especially if taken together. There are also various little treatises on elementary technical practice, usually written by artists, and published by the colour-makers, from which good practical hints may be obtained as to the use of instruments and materials. It is not generally known in England that there is a sufficient national collection of water-colours, with the exception of forty copies of the most important landscapes by great masters, which have been published by the British Museum, to which access may easily be obtained on compliance with a simple formality. The student is earnestly recommended to avail himself of these treasures, which are generally strangely neglected.

A handbook to the Department of Prints and Drawings, with an introductory notice of the various schools (Italian, German, Dutch, Flemish and English) has been lately compiled by Mr. Fagan, of the Museum, and published by Messrs. Bell & Sons. A collection of drawings by the Italian masters in the British Museum has been lately published in autotype by Messrs. Chatto & Windus, with notes by Mr. Comyns Carr, which, it is to be hoped, will be followed by similar publications from other schools. It is much to be regretted that some portion, at least, of these national treasures should not be made readily accessible to the general public by framing and putting them under glass in a gallery, according to the plan adopted in the Louvre. Their very existence is not so much as suspected by the great majority even of cultivated Englishmen.

DRA-YTON, Michael (1563-1631), English poet, was born at Hartshill, near Atherstone, in Warwickshire, in 1563. Even in childhood it was his great ambition to excel in writing verse. At the age of ten he was sent as a page into some great family, and a little later he is supposed to have studied for some time at Oxford. Sir Henry Goodere became his patron, and introduced him to the court of King James I, where he received the title of Grecian. He died in London, in 1603 under the title of The Barons' War. In 1598, he produced his first book, The Harmony of the Church, a volume of spiritual poems, dedicated to Lady Daventry. The best known work in this vogue of the Song of Solomon, executed with considerable richness of expression. A singular and now incomprehensible fate befell the book; with the exception of forty copies seized by the archbishop of Canterbury, the whole edition was destroyed by public order. It is preserved in a few copies and is now coming up to town laden with poetic wrappings, for he published a vast amount within the next few years. In 1593 appeared Idea: The Shepherd's Garland, a collection of pastoral, in which he celebrated his own love-sorrows under the poetic name of Rowland. The circumstances of this passion appear more distinctly in the cycle of 64 sonnets, published in 1594, under the title of Idea's Mirror, by which we learn that the lady lived by the river Anker, in Warwickshire. It appears that he failed to win her "Idea," and lived and died a bachelor. The same year, 1594, saw the publication of Matilda, an epic poem in rhyme royal, the first of his studies from English history. It was about this time, too, that he brought out Endymion and Phaethon, a volume which he never republished, but which contains some interesting autobiographical matter and acknowledgments of literary help from Lodge, if not from Spenser and Daniel also. In his Fig for Formosus, Lodge has reciprocated these friendly courtesies. In 1596 Dryton published his long and important poem of Mortimer's Cause, which deals with the Wars of the Roses, and is a very serious production in octavo Roma. He afterwards enlarged and modified this poem, and republished it in 1603 under the title of The Barons' War. In 1596,
also, appeared another historical poem, The Legend of Robert, Duke of Normandy, and a similar piece on Pierre Gassendi. In 1597 appeared England's Heroical Epistles, a series of historical studies, in imitation of those of Ovid. These last poems, written in the heroical couplet, contain some of the finest passages in Drayton's writings. With the year 1597 the first half of the poet's literary life closes. He had become famous by his rapid production of volumes, and he rested on his ears. It would seem that he was much favoured at the court of Elizabeth, and he hoped that it would be the same with her successor. But when, in 1603, he addressed a poem of compliment to James L on his accession, it was ridiculed, and his services rudely rejected. His bitterness of spirit found expression in a satire, The Owl, which he printed in 1604, although he had no talent in this kind of composition. Not much more entertaining was his scurrilous narrative of Moses in a Map of his Miracles, a sort of epic in heroics printed the same year. In 1605 Drayton republished his most important works, that is to say, his historical poems and the Idea, in a single volume, which ran through eight editions during his lifetime. He also collected his smaller pieces, hitherto unedited, in a volume undated, but probably published in 1606, under the title of Poems Lyric and Pastorall; these consisted of odes, elegies, and a fantastic satire, called The Muse in the Moon. Some of the odes are extremely stippled. He then adopted the extraordinary resolution of celebrating all the points of topographical or antiquarian interest in the island of Great Britain, and on this laborious work he was engaged for many years. At last, in 1613, the first part of this vast work was published under the title of Poly-Olbion, mid eight books being produced, to which the learned Selden supplied notes. The success of this great work, which has since become so famous, was very small at first, and not until 1622 did Drayton succeed in finding a publisher willing to undertake the risk of bringing out twelve more books in a second part. This completed the survey of England, and the poet, who had hoped to "crown Scotland with flowers," and arrive at last at the Arcades, never crossed the Tweed. In 1627 he published another of his uncollapsible volumes, and this contains some of his most characteristic and exquisite writing. It consists of the following pieces:—The Battle of Agincourt, an historical poem in octavo rima, and The Miseries of Queen Mary, written in the same verse and manner; Nymphidia, the Court of Faery, a most joyous and graceful little epic of fairyland; The Quest of Cynthia and The Shepherd's Sirena, two lyrical pastorals; and Finally The Moon Calf, a sort of satire. Of these Nymphidia is perhaps the best thing Drayton ever wrote, except his famous ballad on the Battle of Agincourt; it is quite unique of its kind, and full of rare fantastic fancy. The last of Drayton's voluminous publications was The Muse's Elucidum in 1630. He died in London on the 23d of December 1631, was buried in Westminster Abbey, and had a monument placed over him by the countess of Dorset, with memorial lines attributed to Ben Jonson. Of the particulars of Drayton's life we know almost nothing but what he himself tells us; he enjoyed the friendship of some of the best men of the age. He corresponded familiarly with Drummond; Jonson, Browne, Withers, and others were among his friends. In one of his poems, an "elegy" or epitaph to Sir Henry Reynolds, he has left some valuable criticisms on poets whom he had known. He was even engaged in the labour of the dramatists; at least he had a share, with Munday, Chettle, and Wilson, in writing Sir John Oldcastle, which was printed in 1600. That he was a restless and discontented, as well as a worthy master, is gathered from his last published work. The works of Drayton are bulky, and, in spite of the high place that he holds in critical esteem, it cannot be pretended that he is much read. For this his ponderous style is much to blame. The Poly-Olbion, the most famous but far from the most successful of his writings, is tedious and barren in the extreme. The metre in which it is composed, a couplet of Alexandrines, like the French classical measure, is wholly unsuited to our language, and becomes excessively wearisome to the reader, who forgets the learning and ingenuity of its author in labouring through its harsh and overgrown lines. His historical poems, which he was constantly rewriting and improving, are much more interesting, and often rise to a true poetical eloquence. His pastorals are brilliant, but overlaid with colour and sweet to insipidity. It is, with one or two magnificent exceptions, an indifferent sonneteer. The poet with whom it is most natural to compare him is Daniel; he is more rough and vigorous, more varied and more daring than the latter, but Daniel surpasses him in grace, delicacy, and judgment. In their elegies and epistles, however, the two writers frequently resemble each other. Drayton, however, approaches the very first poets of the Elizabethan era in his charming Nymphidia, a poem which inspired Herrick with his sweet fairy fancies, and which stands alone of its kind in our literature; while some of his odes and lyrics are inspired by noble feeling and high imagination.

In 1748 a folio edition of Drayton's complete works was published, under the editorial supervision of Oldys, and again in 1753 there appeared an issue in four volumes. But these were very unattentively and carelessly prepared. An attempt is now being made to republish Drayton in a more critical spirit. The works are printed in four volumes, and a new edition of The Muses' Elucidium, with notes. The success of his work, which has already been mentioned, was quite unique of its kind in our literature; while some of his odes and lyrics are inspired by noble feeling and high imagination.

DREAM. Dreams are a variety of a large class of mental phenomena which may be roughly defined as states of mind which, though not the result of the action of external objects, resume the form of objective perceptions. To this class belong the fleeting images which occasionally present themselves during waking hours, and especially before sleep, the "visions" which occur in certain excited emotional conditions, as in religious ecstasy, the hallucinations of the insane, the mental phenomena observable in certain artificially produced states (hypnotism), &c. These and other mental conditions resemble one another in many important respects, to be spoken of by and by. At the same time they are roughly marked by certain special circumstances. Thus, dreaming may be distinguished from the other species of the class as depending on the most complete withdrawal of the mind from the external world. All products of the imagination which take the aspect of objective perceptions must, it is clear, involve a partial abstraction of the intellectual processes. Yet in all cases except that of dreaming—including even somnambulism—the mind preserves certain limited relations to external objects. In dreams, on the contrary, the exclusion of the external world from consciousness is for the most part complete. Sleep has under normal circumstances the effect both of closing the avenues (sensory nerves) by which external impressions are conveyed to consciousness, and of cutting off from the mind that mechanism (the voluntary, motor nerves and muscles) through which they maintain and regulate its varying relations to the outer world. Dreams cover a great variety of mental states, from fleeting momentary fancies to extended series of imaginations. Again, dreams have certain constant or approximately constant features, while in other respects they manifest wide diversity. Among the most general characteristics is to be named the apparent objectivity of dream-experience. The presence of this objective element in dreams is clearly indicated in their familiar ad vocum appearance. This points to the well-recognized fact that a large part of our dream-imagination simulates the form of visual perception.
The next general characteristic of dreams is that, though resembling waking experience in many respects, they seem never exactly to reproduce the order of this experience. Most of our dreams differ very widely from any events ever known to us in waking life, and even those which most closely resemble certain portions of this life introduce numerous changes in detail. These deviations involve one or two distinct elements. First of all, there is a great confusion of the order in time, space, &c., which holds among real objects and events. Widely remote places and events are brought together, persons set in new relations to one another, and so on. Secondly, the objects and scenes are apt to assume a greatly exaggerated intensity. They take a firmer hold of us, so to speak, than our waking experience. We may when awake think of dreams as unsubstantial and unreal, but to the dreamer at the moment his unimagined surroundings are more real, more impressive, than the actual ones which he perceives when awake. Dream-fancy exaggerates the various aspects of objects, makes what is large still larger, what is striking still more striking, what is beautiful still more beautiful, and so on.

Having touched on these approximately universal characteristics of dreams, we will now specify a few of the more variable features. For example, in a large number of our dreams we appear to be passive spectators of events which we are incapable, or rather do not think of controlling in any way. In other dreams, again, we seem to be lively actors in the scene,—talking, moving, &c., as we are wont to do in waking life. In a class of dreams lying midway between these two extremes we appear to be impelled to act, to be struggling to seize some offered good or to avert some threatening evil, yet to be unable to execute our wishes. Once more, dreams differ very much as to their degree of reasonableness. It is certain that in many cases the dreamer is easily imposed upon, sees no contradictions, does not seek to understand the events which unfold themselves before his fancy, and so on. In some instances, indeed, the mind of the dreamer loses even the sense of identity in objects, and metamorphoses persons in the most capricious manner; and this confusion of identity may perhaps be the dreamer himself, so that he imagines himself to be somebody else, or projects a part of himself, so to speak, into another personality, which thus becomes an alter ego and an object for the contemplation of the remaining self. Yet though it is true that many, probably a large proportion, of our dreams are thus unintelligible to waking thought, there is a number of well-authenticated dreams in which persons have proved themselves to be possessed not only of their ordinary, but even of an extraordinary, power of reflection. We refer to the well-known stories of the intellectual achievements of Condillac, Condorcet, Coleridge, &c., when dreaming. Once more, great differences are observable in dreams with respect to the feelings excited by the visionary experiences. Sometimes the circumstances in which we find ourselves affect us much as in waking life,—anger terrifies us, beauty delights us, and so on. At other times, however, we are not thus affected:—what would puzzle, confuse, or shock our minds in waking experience fails to do so in dream-life. Finally, there are certain exceptional features of dream-life, as a vague consciousness of dreaming, which assumes the form of a dream within a dream, and the repetition of the images of previous dreams with a recognition of the familiarity of the dream scenes. It need hardly be added that dreaming varies with quantity and in quality, according to individual temperament, habits of thought, &c.

Theories of Dreaming.—From the slight sketch of the character of the dreaming process just given, it might be conjectured that the human mind at all times would be profoundly impressed with the fact of dreaming, and seek to arrive at some explanation of what on the surface is undoubtedly so mysterious and so wonderful a phenomenon. And as a matter of history we find that men have in all the known stages of their intellectual development endeavoured to account for the visions of the night. The various theories thus put forward fall into two main classes—the super-ordinary, power of reflection. We refer to the well-known portionalism, which holds among real objects and events. Widely remote places and events are brought together, persons set in new relations to one another, and so on. Secondly, the objects and scenes are apt to assume a greatly exaggerated intensity. They take a firmer hold of us, so to speak, than our waking experience. We may when awake think of dreams as unsubstantial and unreal, but to the dreamer at the moment his unimagined surroundings are more real, more impressive, than the actual ones which he perceives when awake. Dream-fancy exaggerates the various aspects of objects, makes what is large still larger, what is striking still more striking, what is beautiful still more beautiful, and so on.

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(a) The Dream as an Immediate Objective Experience.—According to recent researches the savage mind regards dreams as no less real an objective experience than waking experience and the objects and scenes which first appear in the dreaming fancy of the primitive man are real maternal existences, the sounds he seems to hear are real external sounds, the dream figures which stand before his imagination and converse with him are real persons. How then does he conceive the relation of this dream-world to the world of waking experience? This question has lately been answered by Mr. E. B. Tylor and Mr. Herbert Spencer. The belief in the objective reality of dreams requires the savage to conceive a double nature both for objects (animate and inanimate) external to himself and for himself. The vision of dead ancestors, of material objects long since lost or destroyed, easily suggests the idea of a duplicate of the original person of thing, a second self or soul. On the other hand, when the savage dreams that he goes forth to accustomed scenes, to hunt, to fight, and so on, he accounts for the dream by the supposition that his own second self or soul leaves the body and passes forth to the particular locality. Thus the dream-life shames itself to our primitive philosopher as an intercourse of souls or duplicate selves, co-ordinate in kind and of equal reality with the experience of waking life. It appears to follow from the unfamiliarity of dream scenes, personages, &c., that the region visited during sleep will be projected by the savage mind quite outside the world of waking observation. Mr. Spencer connects with this fact the earliest theories of another world or a spiritual state. (For a fuller account of the part played by dreams in primitive ideas consult E. B. Tylor, Primitive Culture, vol. i. chap. xi.; H. Spencer, Principles of Sociology, i. ch. x. et seq.)

(b) The Dream as a Communication from a Supernatural Being.—It is plain that even in the savage's conception of dreaming there is room for the thought of a divine announcement. When once the idea of superior beings, deities, demons, &c., is reached, it becomes natural to regard the visit of some departed soul as the despatch of a messenger to the dreamer. In this way the first mode of explanation passes insensibly into the second. In higher stages of religious thought the view of a dream as a divine revelation takes a less crude form. The immediate object present to the dreamer is no longer conceived as possessing the same degree of materiality. Something is still present, no doubt, and so the dream is in a sense objective; but the reality is less like a tangible material object, and is transformed more or less completely into something unsubstantial, spiritual, and intangible. On the other hand, the dream is objective in the sense of being a message or revelation from some actual divine personage. The essence of the
function of dreams has been fully recognized in all the nations. At times, too, the divinely created vision is distinctly disguised and only partially divulged by symbol, in which case there arises the necessity of an art of interpretation. Thus at times the oral utterance may assume the form of a dim oracular declaration which calls for careful attention and a certain skill in the application of verbal figures. This is, however, in the last form of dream-revelation that we find the greatest demands made on the interpreter’s art. It follows from what has been said respecting the novelty of dream-combinations that many of the visual images which make up so large a bulk of our dreams cannot be fitted to any actual order of events. Hence, if such dreams are to be interpreted as having a bearing on actual events, they must be regarded as figurative or symbolic. Accordingly we find that the symbolic function of dreams has been fully recognized in all the theories of dreaming now dealt with. It seems to have been assumed that the normal mode of divine communication to man during sleep was that of such a figurative dream. And agreeably with this supposition the task of deciphering dream-symbols gradually grew into a skilled art, which became the prerogative of a certain class of experts,—as prophets, divinators, or magicians.

A very brief historical review of this religious theory of dreams must here suffice. Among the Oriental peoples this view of dreams was the prevailing one. We find, however, great differences in the mode of interpretation adopted. Among the ancient Hebrews, for example, we find all the three forms of dream-communication mentioned above. As to interpretation there seem to have been no definite rules, and the procedure followed resolves itself into an attempt to discover the most natural or least forced application of the persons, objects, and relations of the dream to some existing person, social circumstances, and events. This mode of interpretation clearly left wide scope for individual skill. In the Persian scheme of interpretation, on the other hand, so far as we can judge of it from the compilations of a later age, the art of dream-interpretation, oneirocritics, or oneiroscopy, was defined and fixed in a number of rules. Thus in the work known under the name of the Ṣafat-Šiūrah, minute and elaborate prescriptions are given for interpreting various classes of dreams according to the particular day of the month on which they occur. A similar systematization of the rules of dream-interpretation is to be met with among the Arabs (see L’Ouvrerie Musulman, par Gabdorrahachaman, traduction de Pierre Vattier). In such cases, it is plain, the interpretation of dreams involved less of individual genius or inspiration, and became a more mechanical process, involving only careful knowledge of formulae, and one which could be easily communicated. Such a state of things points to the transition of dreamlore from the stage of an exoteric mystery to that of a communicable science. Among the Greeks and Romans the religious view of dreams is to be found in popular literature as well as in philosophic writings. In Homer, dreams are distinctly said to be sent by the gods and goddesses, as in the expression θείον ὅρων, and it is implied that they may be intended to deceive the subject of them (e.g., Agamemnon’s dream, Iliad, book ii.). Similarly the dramatists frequently speak of foreknowledge divinely communicated by dreams (e.g., Clytemnestra’s prescience as to the fall of Troy in the Agamemnon of Eschylus is ascribed to a dream). The popular view was countenanced to a certain extent by philosophers. Thus Plato found in dreams a view of the world in his mystic scheme of life. On the other hand, the communication may be disguised and only partially divulged by symbol, and it is obvious that we find the greatest demands made on the interpreter’s art. It follows from what has been said respecting the novelty of dream-combinations that many of the visual images which make up so large a bulk of our dreams cannot be fitted to any actual order of events. Hence, if such dreams are to be interpreted as having a bearing on actual events, they must be regarded as figurative or symbolic. Accordingly we find that the symbolic function of dreams has been fully recognized in all the theories of dreaming now dealt with. It seems to have been assumed that the normal mode of divine communication to man during sleep was that of such a figurative dream. And agreeably with this supposition the task of deciphering dream-symbols gradually grew into a skilled art, which became the prerogative of a certain class of experts,—as prophets, divinators, or magicians.

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is the power of accompanying the soul in its flight to the celestial regions, and of sharing in the contemplation of Divine truths. Socrates extols the rank of dreaming among the arts of divination, setting it far above other modes of prophecy as being more simple and sure, open to all, unencumbered with expensive and laborious preparations, and so on. He affirms that he has repeatedly found dreams of service in arranging his ideas, and in improving his style of composition. Medieval and modern Christian theologians have continued to attribute dreams, or, more accurately, certain orders of dream, to the intermediate agency of the divine Being. The popular theory of dreams to be met with among the later European peoples bears the impress of that folklore which developed itself in the Middle Ages under influences partly Christian, partly pagans. Dreams were referred to a variety of supernatural agencies, including not only God and the devil, but also subordinate beings, as fairy, fiend (incubus), &c. Further, the art of interpreting dreams according to definite rules (omniscience) was developed to a very high point. (See Brand, Popular Antiquities, vol. ii. Dictionary of Dreams). In our own times certain restricted classes of dreams are customarily associated with the action of benevolent or malignant beings. On the other hand, people are now wont to interpret dreams as omens or signs without distinctly attributing them to any supernatural agent. This view of dreams forms the transition point between the religious and the scientific theories.

(c) The Dream as a Subjective Phenomenon Dependent on Natural Causes. - While the theory of the divine or supernatural origin of dreams has thus held its ground so long, there has been gradually growing up from an early period of human history a more scientific conception of the phenomenon as dependent on natural laws (of mind and body). Psychologists and physiological alike have approached the subject from their respective points of view, and sought to explain the phenomena of dreaming as natural events. The first germ of a scientific theory of dreams are to be found in antiquity. Thus Democritus, from whom the Epicureans derived their theory, held that dreams are the product of the summation or phantasms of corporeal objects which are constantly floating in the atmosphere, and which attack the soul during repose. Again, Plato speaks in the Republic of dreaming as illustrating the dominant mental impulses and habits of the individual (unchecked appetite, and temperance with its inverse), and the phantasms which may accompany waking operations of feeling and thought. Aristotle in his short treatise on dreams (προν ορωσιν) refers dreaming to the action of objects of outward sense which leave behind impressions on the soul and body. Dreaming is said to be the function of the sensitive part of the mind, but of this so far as phantasia; and a dream is defined as "the phantasm arising from the sense of sensible perceptions when it presents itself to him who is asleep." Aristotle further has some correct observations on the immediate bodily conditions of dreaming, such as the exaggeration of sensation in this condition of mind. Thus, he says, we fancy it thunders and lightens when a small sound is produced in our ears; we imagine that we are eating honey in consequence of a defluxion of the least quantity of palsem. In the De Divinatis of Cicero we have an unique instance among classic writings of a complete rejection of the doctrine of the supernatural origin of dreams, and of a full and consistent adoption of the natural method of explaining the phenomena. Cicero's position stands in marked contrast to that of partial sceptics, as, for example, Pliny, who seems content to exclude from the supernatural method of explanation certain of the more obviously natural dreams, such as those occurring immediately after food and wine, when one has just fallen asleep after waking (Nat. Hist.).

While philosophers were thus learning to regard dreams as natural processes, physicians, on the other side, had their attention called to dreaming in its relation to pathological bodily conditions. It seems probable, indeed, that men occupied in studying bodily diseases were among the first to suspect the true nature and origin of dreaming. Thus Hippocrates, while inclined to admit that some dreams may be divine, distinctly says that others arise from the action of the mind and the body. Hippocrates, too, appears to have been the first to supply a scientific basis for the premonitory character of certain kinds of dreams. There are dreams, he says, which announce beforehand the afortoions of the body. This idea has, as we shall see presently, been confirmed by modern pathological observations. It is easy to understand that this prophetic side of dreams was in the early stages of knowledge greatly exaggerated. Thus appears to be true of the speculations of Galen, who held that to dream one's thigh was turned into stone signified the approaching loss of this member. This belief in the premonitory character of dreams was only one side of a general doctrine of dreams according to which they arise from bodily disturbances, and so may serve as symptoms which the physician has to include in the complete diagnosis of a case. This idea, which is recognized by modern physiologists as true within certain limits, led in the first crude stages of scientific investigation to exaggerated and fanciful conclusions. Thus a new system of dream-interpretation came into vogue according to which to dream of a certain thing always means a disturbance in one particular organ. On the doctrine of Oriental physiologists (the Hindu and Chinese) dreams are thus referred to pathological states of the five organs—heart, lungs, kidneys, spleen, and liver. Thus to dream of war and fighting signifies a bad state of the lungs; of fire, smoke, &c., a bad state of the heart, and so on.

Modern Theory of Dreams. — Under this head we shall give an account of the principal results of modern investigations, psychological and physiological, on the nature and conditions of dreams. Respecting many points there is still considerable diversity of view. Certain questions are in fact yet remain unanswered, the reason of this being the inaccessibility of dream-phenomena to accurate and adequate observation. Further, owing to the divided condition of psychological principles, the explanation of dreaming assumes very different forms with different writers. On the one hand there are those who conceive the mind as an independent spiritual substance, which employs the body as its instrument, but is not dependent on this. With these, dreams will naturally wear the aspect of products of some spiritual faculty or faculties which are not involved in the sleep of the body and the senses. At the other extreme are those who regard mental phenomena as an outcome of bodily changes, as a refined result of physical processes. By these, dreams will be regarded as given off, so to speak, by the various organs of the body during sleep. Midway between the spiritualist and materialist hypotheses is the scientific view in its narrower sense, namely, the doctrine that the mental and the bodily are perfectly dissimilar regions of phenomena, which are yet connected in such a way that bodily events appear as the conditions of mental events. In the following account of modern dream theory we shall confine ourselves for the most part to the last stand-point, though indicating here and there how the other theories of the relation of mind to body lead to divergent conclusions.

On the very threshold of our inquiry we are met by a much disputed question—What is the relation of dreaming...
Dreaming an indication of imperfect sleep which must cease as soon as the higher nervous centres reach a complete repose? Is it, on the other hand, something wholly spiritual and independent of sleep as a bodily condition? Here we have two different views arising from different theories of the relation of mind and body. These distinct views of the subject have commonly appeared as answers to the question of fact—are we when asleep always dreaming? This question was first raised by philosophers in connection with certain conceptions of the soul and its activity. Descartes, who regarded thought as of the essence of personal existence, was naturally led to maintain that the mind is always thinking. "I am," he says, "I exist, that is certain; but for how long? as long as I think; for perhaps even it might happen that if I ceased wholly to think I should cease at the same time wholly to exist" (Meditation ii). Among the Cartesians the proposition, the mind is always thinking, became a leading tenet. Locke argues against this supposition. He contends that in sleep men do not always think, or they would be conscious answers. And the next moment distinct views of the subject have commonly appeared in the mind. It is asserted that in sleep the soul thinks apart from the body. If it is asserted that they think but they forget it, he replies it is "hard to be conceived" that "the soul in a sleeping man should be this moment busy a-thinking, and the next moment in a waking man not remember not be able to recollect one jot of all those thoughts." To suppose that in sleep the soul thinks apart from the body involves the absurdity of a double mind, and is further contradicted by the irrationality of dreams (Essay, book ii. ch. 1). Locke was answered by Leibnitz in the Nouveaux Essais, who upheld the Cartesian affirmation, and maintained that during sleep the mind has always some "little perceptions" or "confused sentiments," though, according to his doctrine of unconscious perceptions, these need not become objects of conscious attention. That we never sleep without dreaming is further maintained by Kant in his Anthropology, by Jouffroy and others. In his Lectures on Metaphysics, Sir W. Hamilton argues fully for the same idea. He says that during sleep the mind "is never either inactive or wholly unconscious." He seeks to refute the argument of Locke, that we ought to remember our dreams, by calling attention to the fact that the somnambulist has no recollection of his dream, and that persons who betray in their expression and utterance the characteristics of sleep, by calling attention to the fact that the somnambulist has no recollection of his dream, and that persons who betray in their expression and utterance the characteristics of sleep, have been said to be "confused in their reasoning," by the absence or suspension of the will. The importance of the cessation of the will's action has been emphasized by Duval and Stewart (Elements of the Phil. of the Human Mind, vol. i. chap. v. sect. 5). Stewart does not mean that the will is wholly dormant in sleep, but that it loses its hold on the faculties. By this supposition he seeks to account not only for the incoherence but also for the apparent reality of dream-images. That the absence of the normal processes of volition, especially as involved in attention, constitutes one important factor in the explanation of dreaming seems to be admitted by all writers,—for example, Sir Darwin (Zoonomia), Sir Benj. Brodie, Dr Carpenter, and M. A. Maury (Le Sommeil et les Rêves). It is doubtful, however, whether this simple hypothesis explains all that Stewart refers to. Maury objects to Stewart's theory that the will does not wholly lose its command of the bodily organs, etc., in dreams.

While great stress has thus been laid by some writers on this negative condition, the suspension of will, others have sought to construct a simple theory of dreaming by supposing that the unimpeded action of some mental faculty. Thus Cadworth (Treatise concerning Eternal and Immutable Morality) reasons, from the orderly coherence of dream-imagination and the novelty of their combinations, that this state of mind arises from the action of "the phantastical power of the soul," and not from "any fortuitous dancings of the spirits." A very curious theory of dreaming as depending on a particular circum-
scribed faculty the soul is to be found in Scherner's Das Leben des Traumens. Dreaming is a decentralization of the movement of life. In waking consciousness the central forces, the ego spontaneity, is supreme,—in dreaming the activity of the ego becomes purely receptive. The central ego is now merely the point about which the peripheral life plays in perfect freedom. Thus the will (the spontaneous force of the ego) is suspended, and thought loses its categories. On the other hand, the imagination now freed from the ego reaches its perfect unrestrained function. And this function is seen in the symbolic representation both of the bodily parts and of the mental stimuli which influence the conscious perception of the creative fancy in dreaming is adopted by Dr Johannes Volkelt (Die Traumphantasie).
In addition to these simple metaphysical and psychological theories of dreaming, there are to be found no less simple physiological hypotheses. Among these we may take the opinion of Hobbes (Leuethen), that the imaginations of dreams all proceed from "the agitations of the inward parts of a man’s body," the disturbance of which parts, owing to their connections with the brain, serves to keep the latter in motion. Another simple physiological hypothesis for explaining dreams is offered by Schopenhauer. According to this writer, the exciting causes of dreams are impressions received from the internal regions of the organism through the sympathetic nervous system. These impressions are afterwards worked up by the mind into quasi-realities by means of its "forms" of space, time, &c.

This simple and "geometric" method of explaining dreams, though it may be valuable up to a certain point, must necessarily fail to account for all the phenomena concerned. As we have shown in our preliminary discussion of the sources of dream-imagination, or the stimulations which are the immediate causes of these. The second question has to do with the order or form of dream-combinations, and seeks to determine the conditions of the peculiar arrangements, simultaneous and successive, which are observable in dreams. The last problem is that of accounting for the objective reality and generally for the intensity and impressiveness of dream-fancies.

In briefly opening up each of these lines of inquiry we shall seek to keep in mind the variable as well as the constant features of dreaming; also we shall proceed, as far as possible, according to that double method of study, the psychological and the physiological (subjective and objective), which offers itself to those who accept the idea of a perfect parallelism between mental and bodily events.

(A) The Sources of Dream Materials. — The numerous images which make up the ever-renewed current of a dream appear sometimes to come from the internal depths of the mind itself. In other cases, as even the ancients recognized, they depend on a stimulation of the brain arising from varying conditions of the bodily organs. According to the view that all mental events have their physical accompaniments, the first class of imaginations must also be referred to certain conditions of the brain and nervous system. These various sources of dream-activity are roughly classified by Hartley in his Observations on Man. Dream-images, he tells us, are deducible from three causes: — (1) impressions and dreams their creations; (2) present state of the body (especially the stomach and the brain); (3) association. The large part played by bodily states in our dream-life is recognized not only by physiologists, as Maury, but also by those who ascribe dreams in part to occult spiritual faculties, as Scherner. By help of the results of recent researches we are able to improve a little on Hartley’s classification. The exciting causes of dream-images fall into two main classes: — (I) peripheral, and (II) central stimulations. The latter arise in the outlying parts of the nervous system, namely, the organs of sense, the muscular apæatus, the internal bodily organs, together with the external portions of the nerves connected with these.

Central stimulations are such as arise mainly, if not entirely, within the encephalic region. These again are either (a) direct, or (b) indirect. The first depend on the condition of the nerve-elements acted upon, and the unknown influences (possibly connected with the circulation) brought to bear on these at the moment. The indirect stimulations arise as a result of some preceding excitation in a connected region of the brain. They form the apparently spontaneous imaginations of dreaming, as well as those which are the echo of a recent waking experience. The latter are the physical counterpart of images or ideas called up by association with preceding images or thoughts.

(1) Among peripheral stimulations are to be noticed (a) those which arise from the action of external objects on the organs of sensation. Recent researches show that these may play an important part in dreams. Dr Beattie speaks of a man who could be made to dream about a subject by whispering into his ear. Experiments were made by M. Giron de Bazemargues (Journal de Physiol tom viii) as to the effects of external impressions on dreaming. Thus, by leaving his knee uncovered during sleep, he dreamt he was travelling in a diligence (where knees are apt to get cold). The most elaborate experiments bearing on this point have been carried on by Afl. Maury, with the help of an assistant. A large plaster was applied to his face and then torn off. Sensations of hearing, smell, and taste were also followed by appropriate though greatly exaggerated images. Wundt (Physiologische Psychologie) thinks that cutaneous sensations, arising from the varying pressure and temperature of the bodily surface, are frequent excitants of dream-images. (2) Along with such objective sensations must be reckoned subjective sensations which arise in the absence of external stimuli, and which have as their physical basis the phenomena of the central regions of the brain. Of such are the visual images (Schimmenbilder) seen by J. Muller, Goethe, Parkins, and others, when the body is disposed to sleep. These are called the dream-chaos by Gruithuesen, since they are supposed to form the raw material of dreams. Maury gives a full account of these phenomena, which he terms "hypnagogic hallucinations," and which appear to include not only visual images but also subjective sensations of sound, touch, &c. He attaches great importance to the action of these subjective sensations in dreams. The predominance of visual imagery in dreaming appears to be connected with the great activity of the organ of sight and its consequent excitability. It is to be added that one can only roughly distinguish these subjective sensations, which involve the peripheral regions of the nervous system, from images supposed to be confined to the central regions. (3) The condition of our muscles during sleep, which somehow convey impressions to the brain, affect consciousness, and so influence dreaming. To this source we must refer the active phenomena of dreams, as running, flying, resuscitating, struggling, &c. It is probable, as Wundt remarks, that the movements of the body during sleep, such as the breathing and the extensions and contractions of the limbs, give rise to dream-fancies, and painful conditions of the muscles due to an awkward position of the limbs may also serve to excite images. (5) Among the most frequent hallucinations of dreams are those connected with the varying states of the internal bodily organs. The prominence given to this source of dreaming
in ancient and modern systems of medicine has already been referred to. States of the stomach, lungs, heart, secretory organs, teeth and mouth, and general, as we all know, powerful provocatives of dreams. Owing to the close connection of dreams with these organic conditions they may serve as important elements in the diagnosis of bodily disease. Thus M. Macaro (Du Sommeil, des Rêves, et du Somnambulisme) recognizes among the morbid class of dreams those which are "prodomic," or premonitory (e.g., a dream of sanguinary conflicts before hemorrhage), as well as those which are symptomatic of existing bodily and mental disorders.

(II) We pass to internal or cerebral excitations. Under (a), the direct excitations, are to be included all dream-ideas which do not arise from bodily stimuli, or through association, with preceding feelings and ideas. It seems fairly certain that many of our dream-images are thus occasioned by a kind of "automatic excitement" of the cerebral regions. The dreams which clearly arise from an after-effect in the brain of recent perceptions, especially those of the previous day, appear to illustrate this process. Also, many of the images which correspond to persons and scenes supposed to be long since forgotten may be due to some such local automatic cerebral "sub-excitation." Maury distinctly recognizes this factor in dream-estimation. It appears from many cases recorded by him that by means of these automatic central excitations images may sometimes be called up of objects which have never been distinctly perceived, and which yet have left a trace of their action on the cerebral substance. (b) The indirect central stimulations include, no doubt, a large number of our dream-fancies. When once a starting-point is reached, whether through a peripheral or a central automatic (direct) excitation, the nervous connections which answer to mental associations provide a vast range of new material. It is to be added that these general excitations may largely be accounted for by a kind of association acting on all the coherent, heterogeneous and disconnected elements supplied by the periphery and central (direct) stimulation at the time, there being no volitional control (dominating attention) to interfere with the process. Summarizing that these two primary sources are continually sending forth new and disconnected images to the dream-consciousness, and that owing to the extreme excitability of the brain during sleep numerous paths of association open themselves up in connection with every such image, we may see how it is that objects group themselves, and even unite themselves, without any such chaotic manner. It is not correct to say that we here dispense with the "forms" of space and time; objects are viewed in space, and events "intuited" in time, it is only that the particular positions of things in space and time are overlooked. On the other hand, it is true that there is in these loosely-threaded dreams, if not in all dreams, a suspension of the reasoning process by which objects are intuited in a causal relation. In these dreams, then, the mind is passive, and consciousness is made up of a flur of images and feelings which is not analyzed and rationalized as it is in the normal processes of waking perceptions.

(5) Let us now consider the more coherent class of dreams. These, as we have seen, have by some been accounted for as the products of some occult power of the soul, as the "phantastical power" of Cudworth and the symbolic plastic phantasy of Scherner. There is no doubt that in many of the more elaborate and pictorial of our dreams a result is reached very similar to the products of the waking imagination. Can this operation be analyzed into simple processes? First of all, the images, however disconnected their corresponding objects may be, group themselves in a certain arrangement. This process would be described by psychologists of the Kantian school as the superposition on the dream-materials of certain mental forms. On the other hand, it may perhaps be explained as a result of association. When two orders of impression—for example, the sight of the human form and the sound of a human voice—have been habitually associated, there arises what may be called a general associative disposition to connect some variety of other order of impression with any particular variety of the order which happens to present itself to the mind; and so, when dreaming, the mind is disposed to add to images of colour certain relations of space, position, magnitude, &c., to images of human beings some form of the appropriate human actions, relations, &c. By this means the intuitive clearness and completeness of our dream-imaginations may largely be accounted for. It is to be added that these general associative tendencies do not determine what particular relations or actions are to be added to the images. These latter depend on the particular circumstances of the moment, as, for example, the locality of the optic fibres involved, the varying excitability of the central regions, &c.

In this factor of our dream-constructions the mind seems to be wholly passive. We have now to turn to a second influence, which involves to some extent the active side of the mind, namely, the play of attention under the influence, not of the will, but of certain vague emotional impulses. The chief of these are the feeling for unity, and the instinct of emotional harmony. First of all, there seems to be a tendency in the more orderly dreams to bring new images into some intelligible connection or relation of unity with the pre-existing ones. This vague impulse, acting through the processes of expectation and attention, becomes selective, leading to a retention of those members of the ever-renewed flux of images which are fitted to enter into the dream-scene as consistent factors. In certain cases, indeed, this process seems to rise to something like a conscious voluntary exertion. We occasionally remember that we strove in our dream to discover a consistency in the variegated and confused scene presented to consciousness. Secondly, the unity of dream-structure is largely determined by the need and desire of the mind, a large part, if not all, of our dream-fancies are attended with a feeling of pleasure or of pain. Now, when a certain state of emotion has been excited in the mind, there is a tendency to reject all ideas to reject all ideas
which conflict with this feeling, and to accept any which harmonize with it. The emotion controls the movements of anticipation and of intellectual attention, so that suitable ideas are at once recognized and detained. The unity of our most complex dreams appears to arise very largely from this source. In dreams described by Scherner, Volkm., and Wundt the successions of imaginary events are clearly strung together by a thread of emotion, as joy, terror, and so on. The commonest example of such a dominating emotional tone in dreaming occurs when there is a current of pleasurable or painful feeling contributed by the condition of some of the internal organs of the body. These bodily sensations become the basis of complex groups of images, each new scene being connected with some analogous shade of feeling, "bodily" or "mental."

(C) The Objective Reality and Intensity of Dream-Imaginations—These are explained by Hartley by two circumstances,—first, the absence of any other reality to oppose to the ideas which offer themselves, and secondly, the greater vividness of the visual images which occur in dreams as measured by the corresponding waking ideas. This last fact may, he thinks, be partly accounted for by an increased heat of the brain. As already remarked, Dugald Stewart explains the reality of dreams through the suspension of the ordinary action of volition. In waking life, he says, we distinguish objective impressions from ideas by finding that the former are independent of volition, while the latter are dependent on the same. Hence, in dreaming, when the will no longer controls ideas, these are mistaken for realities. The chief influences here concerned appear to be included in Hartley's theory, though the circumstances emphasized by Stewart may be a secondary element in the case. That the reality of dream-images depends in large part on the absence of external impressions has been recognized by most recent writers. Among others M. Taine (De l'Intelligence) dwells on the function of external sensation as a corrective to internal imaginations, keeping these below the illusory stage. External impressions are distinguished from ideas in the waking state, in part at least, by their greater intensity. When this relation is no longer recognized by reason either of the ideas acquiring preternatural vividness or of the sensations being withdrawn, illusion follows. Waking hallucinations depend on the first circumstance, dream-illusions on the second, perhaps also on the first as well. This leads us to the reflection that during sleep the ideas arising in consciousness undergo an increase of absolute as well as of relative vividness. That is to say, they are in themselves more intense states of consciousness than waking ideas. This seems to point, as Maury observes, to an increased excitability of the nervous substance in sleep. This same circumstance, too, helps to account for the preternatural impressiveness and the exaggeration which meet us in dreams. If the brain is during sleep particularly excitable it will follow that all sensational stimuli, external and internal alike, will produce an exaggerated result. Thus the intensity of sensations will be augmented, and their volume, and so the apparent magnitude of dream-images be increased. Again, if in dreaming the stream of fancies be a rapid one, if images simultaneously and successively crowd in on consciousness, we may understand how space and time may appear to swell to unusual proportions. Once more, the peculiar excitability of the brain will manifest itself in an exaggeration of all feeling. Slight bodily discomforts, for example, will be transformed, as in Maury's experiments, into huge sufferings, and so locally circumscribed bodily sensations of pleasure may expand into preternatural forms of emotional delight.

We are now perhaps in a position to explain the symbolic function of dreams so much emphasized by Scherner. He considers that our dream-phantasy habitually represents the seat of bodily sensations under the symbol of a house and its parts, and the silent processes of thought as the audible conversation of living persons. The latter remark is probably correct, and its truth follows from a consideration of the close association between thought and audible speech. The former observation is surely an exaggerated statement, as has been shown by his friendly critic Volkel. Yet though bodily sensations do not as a rule reveal themselves under the symbol of a building or mass of buildings, they undoubtedly do appear in consciousness disguised and transformed, and the reasons of this are plain. Even in the waking condition we have but a vague consciousness of the seat of the bodily sensations, and in sleep this can hardly be present at all. In addition to this, the exaggerating influences just referred to must tend to disguise the real nature of bodily sensations, and so to remove all consciousness of their locality. Hence bodily sensations do as a rule clothe themselves in a disguise appearing under the form of emotional experiences.

And the particular pleasurable or painful images selected, which will vary with the individual's emotional nature and experience, will be apt to recur as a "symbolic expression" of this variety of bodily feeling. It will follow, too, from the predominance of visual ideas in dreams, that these emotional fancies will commonly take the shape of alluring or alarming visual perceptions.

Dreaming is a subject of great interest by reason of its points of contact with other mental conditions. Thus the common suspension of many of the higher processes of emotion, thought, and volition suggests an analogy between the dreaming state and the insensate stage of mental growth as observable in children, primitive men, and the lower animals. This aspect of dreams has been treated by Maury.

Again, dreaming has many curious resemblances to the mental states of the insane. The differences which mark off dreaming from these states have already been given. The resemblances between them are no less important. In the illusory intensity of its internal images, in the rapidity of its flux of ideas, and in the wildness and incoherence of its combinations, the dream stands very close to the whole class of hallucinations and delusions of waking life. In truth, a systematic psychological treatment of dreams must connect them with other forms of illusion. This is done, for example, by Wundt, who refers all these groups of phenomena to an increased excitability of the sensory regions of the brain. Maury seems disposed to regard dreaming as the incipient stage of a pathological mental condition, of which somnambulism, insanity, &c., are more fully developed forms. Among other writers who have discussed dreams in relation to these other abnormal states of mind are Macaro (op. cit.), Duret de Bounmont (Les Hallucinations), J. Moreau (Du Hasard et d'Alimentation Mentale), also Sir H. Holland, and Dr Carpenter (Mental Physiology).

A good deal of random and undigested information respecting dreams and dream-theories is to be found in Dr Erskine Nicholls's Literature and Curiosities of Dreams. A curious account of the ancients' views of dreams is to be met with in a work entitled Histoire du Somnambulisme, par A. Gauthier. For the best statement of the modern theory of dreams, the student is referred to the works of Maury, Wundt, Carpenter, and Volkel, already named. Dreams have been roughly classified according to the source of their ideas and the relative activity of association and imagination involved, by Scherner, Volkel, and others. The view of the processes involved in the imaginative construction of dreams here adopted has been more fully developed by the present writer in an article in the Cornhill Magazine of November 1876. (J. S.)

DREDGE, THE NATURALIST, is an implement constructed on the general plan of the common water-wheel, and used by naturalists for obtaining specimens of the
DREDGE

animals living on the bottom of the sea at greater or less depths, for the purpose of determining their structure and zoological relations, and ascertaining their geographical distribution. The instrument usually employed in this and other northern countries for dredging oysters and clams is a light frame of iron about 5 feet long by a foot or so in width, with a scraper like a narrow hoe on one side, and a suspening apparatus of thin iron bars which meet in an iron ring for the attachment of the dredge-rope on the other. From the frame is suspended a bag about 2 feet in depth of iron chain netting, or of wide-meshed hemp-cord netting, or of a mixture of both. Naturalist dredgers at first used the oyster dredge, but it is scarcely suitable for scientific purposes. Having a scraper on one side only, it is liable in a current, in deep water, or in unskilled hands, to fall on its back and consequently to come up empty, the scraper not having come into play. Oyster dredgers are not allowed to take oysters below a certain size, and the dredge is made large enough as to allow all small bodies to fall through, and, as many of these are of the highest interest to the naturalist, his object is thus in a great measure defeated.

The remedy for these defects is to have a scraper on each side, with the arms attached in such a way that one or other of the scrapers must reach the ground in whatever position the dredge may fall; and to have the dredge-bag deeper in proportion to the size of the frame, and of a material which is only sufficiently open to allow the water to pass freely through, with the openings so distributed as to leave a part of the bag close enough to bring up the finest mud.

The late Dr Robert Ball of Dublin devised the modification which has since been used almost universally by naturalists in this country and abroad under the name of "Ball's Dredge" (Fig. 1). The dredges on this pattern, used in Britain for ten years after their first introduction, about the year 1838, were usually small and rather heavy—not more than 12 to 15 inches in length, by 4 or 4½ inches in width at the mouth. Two scrapers, the length of the dredge-frame, and 1½ to 2 inches wide, were set at an angle of about 110° to the plane of the dredge's mouth, so that when the dredge was gently hauled along it took hold of the ground and secured anything loose on its surface.

Latterly Ball's dredges of considerably larger size have been used. Perhaps the most convenient form for dredging from a row-boat or yawl, probably the best kind of line is bolt-rope of the best Russian hemp, not less than ½ inches in circumference, containing eighteen to twenty yards in three strands. Each strand should bear nearly a hundred weight, so that the breaking strain of such a rope ought to be about a ton. Of course it is never voluntarily exposed to such a strain, but in shallow water the dredge is often caught among rocks or coral, and the rope should be strong enough in such a case to bring up the boat, even if there were some little way on. It is always well, when dredging, to ascertain the approximate depth with the lead before casting the dredge; and the lead ought always to be accompanied by a registering thermometer, for the subsequent haul of the dredge will gain greatly in value as an observation in geographical distribution, if it be accompanied by an accurate note of the depth.

Depths under 100 fathoms the amount of rope paid out should be at least double the depth; under 30 fathoms, where one usually works more rapidly, it should be more nearly three times; this gives a good deal of slack before the dredge if the boat be moving very slowly, and keeps the lip of the dredge well down. When there is anything of a current, from whatever cause, it is usually convenient to attach a weight, varying from 14 lb to half a hundred weight, to the rope 3 or 4 fathoms in front of the dredge. This prevents in some degree the lifting of the mouth of the dredge; if the weight be attached nearer the dredge it is apt to injure delicate objects passing in.

In dredging in sand or mud, the dredge-rope may simply be passed through the double eye formed by the ends of the two arms of the dredge-frame; but in rocky or unknown ground it is better to fasten the rope to the eye of one of the arms only, and to tie the two eyes together with three or four turns of rope-yarn. This stops breaks much more readily than the dredge-rope alone; so that if the dredge get caught it is the first thing to give way under the strain, and in doing so it often alters the position of the dredge so as to allow of its extrication.

The dredge is slipped gently over the side, either from the bow or from the stern—in a small boat more usually the latter—while there is a little way on, and the direction which the rope takes indicates roughly whether the dredge is going down properly. When it reaches the ground and begins to scrape, an experienced hand upon the rope can usually detect at once a tremor given to the dredge by the scraper passing over the irregularities of the bottom. The amount of rope is then paid out, and the dredge is tied to a bench or roller-pin. The boat should move very slowly, probably not faster than a mile an hour. In still
the dredge, but a pair of brass or bone forceps into the jars of seawater, where their movement and their natural colours may be observed, or placed at once in bottles of strong or weak spirit of wine or dried, according to the object for which they have been collected.

The scientific value of a dredging depends mainly upon two things—the care with which the objects procured are preserved and labelled for future identification and reference, and the accuracy with which all the circumstances of the dredging—the peacock, the depth, the nature of the ground, the date, the bottom-temperature, etc.—are recorded. Every specimen, whether dry or in spirit, should be labelled at once with the number under which that particular dredging is entered in the dredger's note book.

Up to the middle of last century the little that was known of the inhabitants of the sea beyond low-water mark seems to have been gathered almost entirely from the objects found thrown on the beach after storms, and from chance captures on lead-lines, or by fishermen on their long lines, and in trawls and oyster and clam dredges. The naturalist's dredge does not appear to have been used for investigating systematically the fauna of the bottom of the sea until it was employed by Otho Frederick Muller in the researches which afforded material for the publication, in 1779, of his admirable Descriptions and History of the rarer and less known Animals of Denmark and Norway. In the preface to the first volume Muller gives a quaint description and figure of a dredge (fig. 3) not very unlike that used by Bail and Forbes, only the mouth of the dredge was square, a form which, unless used with great caution, gives fatal facilities for "washing out" in the process of hauling in.

At the Birmingham meeting of the British Association in 1839 an important committee was appointed "for researches with the dredge with a view to the investigation of the marine zoology of Great Britain, the illustration of the geographical distribution of marine animals, and the more accurate determination of the fossils of the Fig. 3—Otho Frederick Muller's Dredge (1770)."

This committee was under the general influence of his contagious enthusiasm great progress was made during the next decade in the knowledge of the fauna of the British seas, and many wonderful pleasant days were spent by the original committee and by many others who from year to year were "added to their number." Every annual report of the British Association contains communications from the English, the Scottab, or the Irish branches of the committee, and in 1850 Edward Forbes submitted his first general report on British marine zoology. This report, as might have been anticipated from the eminent qualifications of the reporter, was of the highest value, and taken along with his remarkable memoirs previously published, "On the Distribution of the Mollusca and Radiata of Ægean Sea," and "On the Zoological Relations of the existing Fauna and Flora of the British Isles," may be said to mark an era in the progress of human thought.

The dredging operations of the British Association committee were carried on generally under the idea that at the 100-fathom line, by which amateur work in small boats was practically limited, the zero of animal life was approached—a notion which was destined to be gradually undermined, and finally overthrown. From time to time, however, there were not wanting men of great skill and ex-
perience to maintain, with Sir James Clerk Ross, that "from however great a depth we may be enabled to bring up mud and stones of the bed of the ocean we shall find them teeming with animal life." Samples of the sea-bottom, procured with great difficulty and in small quantity from the first deep soundings in the Atlantic, chiefly by the use of Brooke's sounding machine, an instrument which by a neat contrivance disengaged its weights when it reached the bottom, and thus allowed a tube, so arranged as to get filled with a sample of the bottom, to be recovered by the sounding line, were eagerly examined by microscopists; and the singular fact was established that these samples yielded over a large part of the bed of the Atlantic of the entire or broken shells of certain Foraminifera. Dr Wallich, the naturalist to the "Bulldog" sounding expedition under Sir Leopold McClintock, reported that star-fishes, with their stomachs full of the deep-sea Foraminifera, had come up from a depth of 1200 fathoms on a sounding line; and doubts began to be entertained whether the bottom of the sea was in truth a desert, or whether it might not present a new zoological region open to investigation and discovery, and peopled by a peculiar fauna suited to its special conditions.

In the year 1868, while the question was still undecided, two testing investigations were undertaken independently. In America Count L. F. Pourtales, one of the officers employed in the United States Coast Survey under Professor Piersol, commenced a series of deep dredgings across the Gulf Stream off the coast of Florida, which were continued in the following year, and were productive of most valuable results; and in Great Britain the Admiralty, on the representation of the Royal Society, placed the "Lightning," a small gun vessel, at the disposal of a small committee to sound and dredge in the North Atlantic between Scotland and the Faroe Islands.

In the "Lightning" were the dredging parties placed with the help of a "donkey-engine" for winding in; dredging was carried on with comparative ease at a depth of 600 fathoms, and at that depth animal life was found to be still abundant. The results of the "Lightning's" dredgings were regarded of so great importance to science that the Royal Society pressed upon the Admiralty the advantage of continuing the researches, and accordingly, during the years 1869 and 1870, the gun-boat "Porcupine" was put under the orders of a committee consisting of Dr Carpenter, F.R.S., Dr Gwyn Jeffreys, F.R.S., and Professor Wyrville Thomson, F.R.S., one or other of whom superintended the scientific work. A series of dredging trips in the North Atlantic to the north and west of the British Islands, which occupied two summers.

In the "Porcupine," in the summer of 1869, dredging was carried down successfully to a depth of 2435 fathoms, upwards of two miles and a half, in the Bay of Biscay, and the dredge brought up well-developed representatives of all the classes of marine invertebrates. During the cruises of the "Porcupine" the fauna of the deep water off the western coasts of Great Britain and of Spain and Portugal was tolerably well ascertained, and it was found to differ greatly from the fauna of shallow water in the same region, to possess very special characters, and to show a very marked relation to the fauna of the earlier Tertiary and the later Cretaceous periods.

In the winter of 1872, as a sequel to the preliminary cruises of the "Lightning" and "Porcupine," by far the most considerable expedition in which systematic dredging had ever been made a special object left Great Britain. H.M.S. "Challenger," a corvette of 2306 tons, with auxiliary steam working to 1234 horse-power, was despatched to investigate the physical and biological conditions of the great ocean basins.

The "Challenger" was provided with a most complete and liberal organization for the purpose; she had powerful deck engines for hauling in the dredge, workrooms, laboratories, and libraries for investigating the results on the spot, and a staff of competent naturalists to undertake such investigations and to superintend the packing and preservation of the specimens reserved for future study.

In these deep-sea dredgings it was frequently found that, while few objects of interest were brought up within the dredge, many echinoderms, corals, and sponges came to the surface sticking to the outside of the dredge, and even to the first few fathoms of the dredge-line. This suggested many expedients, and finally a long transverse iron bar was attached to the bottom of the dredge-bag, and large bunches of teased-out hemp were fastened to the free ends of the bar (fig 4). The "kempen-tangles" are now regarded as an essential part of the dredge, nearly as important as the dredge-bag, and often much more conspicuous in its results. This addition to Ball's dredge is not, however, generally available in dredging from a boat or in shallow water; the tangles are apt to catch on rocks or coral, and a turn of the drum of the donkey-engine is required to free them.

Ball's dredge was still employed, with some slight modifications, as the result of further experience. Fig. 4 represents the form of dredge which was found most suitable for great depths. The dredge-frame of hammered iron is 4 feet 6 inches long and 1 foot 3 inches in breadth; the scrapers are 3 inches wide, and are connected at the ends by bars 1½ inches round iron. The arms are of inch round iron, and slightly curved; they are bolted together to a stout iron bar which ends above in a swivel and ring.

Two bars of square iron of some strength are attached by eyes to the round cross-bars at the ends of the dredge-frame, and have the other ends lashed to the iron bar which bears the tangles. These rods keep the dredge-bag at its full length, and prevent it or the tangles from folding over the mouth of the dredge. The dredge-bag is 4 feet 6 inches in length; the lower half is of twine netting so close as to retain everything except the finest mud, which indeed only partially washes through, and the upper half is of twine netting with the meshes an inch to the side. The bag is guarded by three loops of bolt-ropes attached to the frame of the dredge, to the bottom of the bag, and finally to the tangle-bar. The canvas pads represented in the figure on the dredge-frame are only to protect the seizures of the loops. The dredge is suspended by an iron chain, which forms the first few fathoms of the dredge-line. The chain is not, however, directly fastened to the ring at the end of the arms, but is made fast to one of the end bars of the dredge-frame, and it is stopped to the ring by a single strand of bolt-ropes. If the dredge get caught the stop carries away, the direction of the strain on the dredge is altered, and it probably relieves itself and comes up end upwards. In deep water a 28 lb deep-sea lead is usually hung from the centre of the tangle-bar with four tangles on each side.

Dredging was carried on in the "Challenger" from the main yard-arm. A strong pendant was attached by a hook to the cap of the main-mast, and by a tackle to the yard-arm a compound arrangement of 55 to 70 of Hodge's patent accumulators was hung to the pendant, and beneath
it a block through which the dredge-rope passed. The donkey-engines for hauling in the dredging and sounding gear were placed at the foot of the main-mast on the port side. They consisted of a pair of direct-acting, high-pressure, horizontal engines, in combination of 18 horse-power nominal. Instead of a connecting rod to each, a guide was fixed to the end of the piston-rod with a brass block working up and down the slot of the guide. The crank-axles ran through the centre of the blocks, and the movable block, obtaining a backward and forward motion from the piston-rod, acted on the crank as a connecting-rod would do. This style of engine is commonly used for pumping, the pump-rods being attached to the guide on the opposite side from the piston-rod. At one end of the crank a small toothed wheel was attached, which drove one thrice the multiple on a horizontal shaft extending nearly across the deck, and about 3 feet 6 inches above it. At each end of this shaft a large and a small drum were fixed, the larger having three sheaves cast upon it of different sizes, the lesser being a common barrel only. To these drums the line was led, two or three turns being taken round the drum selected. In hauling in, the dredge-rope was taken to a gin-block secured to a spar on the forecastle, then aft to the drum of the donkey-engines on the port side, then to a leading-block on the port side of the quarter-deck, and across the deck to a leading-block on the starboard side corresponding in diameter with the drum used on the port side, and from this it was finally taken by the hands and coiled. The strain is of course greatest at the yard arm and the first leading-block, and by this arrangement it is gradually diminished as the line passes round the series of blocks and sheaves.

A change made latterly in the handling of the dredge had certain advantages. Instead of attaching the weights directly to the dredge-rope, and sending them down with the dredge, a "toggler," a small spindle-shaped piece of hard wood, was attached transversely to the rope at the required distance, 200 to 300 fathoms in advance of the dredge. A "messenger," consisting of a figure of eight of rope, with two large thimbles in the loops, had one of the thimbles slipped over the chain before the dredge was hung, and the other thimble made fast to a hizard. When the dredge was well down and had taken its direction from the dust of the ship, the weights, usually six 28½ deep-sea leads in three canvas covers, were attached to the other thimble of the traveller, which was then cut adrift from the hizard and allowed to spin down the line until it was brought up by the toggle. By this plan the dredge took a somewhat longer time to go down, but after it was adopted not a single case occurred of the fouling of the dredge in the dredge-rope, a misadventure which had occurred more than once before, and which was attributed to the weights getting ahead of the dredge in going down, and pulling it down upon them entangled in the double part of the line.

The great risk in dredging in very deep water is that of the dredge running down nearly vertically and sinking at once into the soft mud, and remaining imbedded until hauling in commences. During the earlier part of the voyage of the "Challenger" this accident seemed too often to defeat, at all events partially, the object of the operation; and, after various suggestions for modifying the dredge, it was proposed to try some form of the trawl in order to insure, so far as possible, the capture of any of the larger marine animals which might be present, and thus to gain a better general idea of the nature of the fauna. A 15-feet beam-trawl was sent down off Cape St Vincent to a depth of 600 fathoms; the experiment was tried at several different depths, but the trawl seemed to answer so well that it was tried again a little farther south in 1090 fathoms, and again it was perfectly successful, and during the remainder of the voyage it was employed almost as frequently, and in nearly as deep water, as Ball's dredge. The deepest successful haul of the trawl was in the Pacific in 3123 fathoms, and the deepest haul of Ball's dredge was in the Atlantic at 3150 fathoms.

During the voyage of the "Challenger" a course of about 70,000 nautical miles was traversed in three years and a half, and 362 observing stations were established at intervals as nearly uniform as circumstances would permit; and at the greater number of these dredging or some modication of the process was successfully performed—52 times at depths greater than 2000 fathoms, and three at depths beyond 3500 fathoms. So fully convinced were the "Challenger" officers that they could dredge at any depths, that it was only want of time and daylight which prevented their doing so at their deepest sounding, 4575 fathoms. The Atlantic was crossed five times, and an errate route through the Pacific gave a good idea of the conditions of the abysses of that ocean, while in the South Indian Ocean dredging and trawling were carried down close to the Antarctic ice-barrier.

The expedition was successful, and the results were of the most interesting nature. Animal life was found to exist at all depths, although probably in diminishing abundance as the depth becomes extreme; and in all parts of the world at depths beyond 400 or 500 fathoms the fauna had much the same general character. The species usually differed in widely separated areas, but the great majority of forms, if not identical, were so nearly allied that they might be regarded as representative and genetically related. Although all marine invertebrate classes were represented, echinoderms in their different orders, sponges, and Crustacea were comparatively scarce. In the first two groups named many forms occurred allied to families which had been previously regarded as extinct or nearly so; thus among the echinoderms, stalked crinoids were by no means rare, and many species of regular Echinidea related to the Chalk genus Echinocardium, and many irregular species allied to Anomalines and Dysaster occurred. The sponges were mainly represented by the Hexactinellida, the beautiful order to which the glass-robe sponges of Japan and the marvellous "Vena's Flower Basket" of the Philippines belong, the order to which the Turritasites of the Chalk must also be referred.

Dredging at these great depths is a difficult and critical operation, and, although by its means some idea of the nature and distribution of the abyssal fauna of the ocean has already been attained, it will be long before the blanks are filled up, for of the area of 140,000,000 square miles forming the "abyssal province" the actual amount hitherto traversed by the naturalist's dredge may still be readily reckoned by the square yard. (C. W. T.)

DREDGING. Dredging is the same given to the severer processes to the process of excavating materials under water, raising them to the surface, and depositing them in barges. It is a process which has been useful from very early times in works of marine and hydraulic engineering, and it has of late years, by improved appliances, been brought to high perfection.

Bag and Spoon Dredge.—The first employment of machinery to effect this object is, like the discoverer of the canal lock, claimed alike for Holland and for the United States, both of which countries dredging is believed to have been practised before it was introduced in this country. It was found practised in the Dutch at a very early period used about 155 lbs per hour "bag and spoon" dredge for clean.
simply a ring of iron, about 2 feet in diameter, flattened and steadied for about one-third of its circumference, having a band of strong leather attached to it by leather thongs. The ring and bag were fixed to a pole, which, on being used, was lowered to the bottom from the side of a barge moored in the canal or river. A rope made fast to the iron ring was then wound up by a windlass placed at the other end of the barge, and the spoon was thus dragged along the bottom, and was guided in its progress by a man who held the pole. When the spoon reached the end of the barge where the windlass was placed, the winding was still continued, and the suspending rope being nearly perpendicular, the bag was raised to the surface, bringing with it the stuff excavated while it was being drawn along the bottom. The windlass being still wound, the whole was raised to the gunwale of the barge, and the bag, being emptied, was again hauled back to the opposite end of the barge, and lowered for another supply. This system is slow, and only adapted to a limited depth of water and soft bottom. But it has been generally employed in canals, and is much used in the Thames. The writer had occasion to use it at the Fossdyke Canal, in Lincolnshire, where 135,000 tons were raised in the manner described.

Dredging by Bucket between two Lighters.—Another plan, practised at an early period in rivers of considerable breadth, was to moor two large barges, one on each side; between them was slung an iron dredging bucket, which was attached to both barges by chains wound round the barrels of a crab winch worked by six men in one barge, and round a simple windlass, worked by two men in the other. The bucket, being lowered at the side of the barge carrying the windlass, was drawn across the bottom of the river by the crab winch on the other barge; and, having been raised and emptied, it was hauled across by the opposite windlass for a repetition of the process. This plan was in use in the Tyne till 1833.

Steam Dredges.—In all large operations these and other primitive appliances have now, as is well known, been superseded by the steam dredges, which was first employed, it is believed, in deepening the Wear at Sunderland about the year 1796. The Sunderland machine was made for Mr Grimshaw by Boulton and Watt. Receiving improvements from Mr Hughes, Mr Rennie, Mr Jessop, and others, the steam dredge, as now generally constructed, is a most powerful machine in skilful hands, excavating and raising materials from depths of 15 to upwards of 30 feet of water according to the size of the machinery, at a cost not very different from, and in some cases even less than, that at which the same work could be performed on dry land. As to the kind of work that may be accomplished by dredging, it may be stated that almost all materials, excepting solid rock or very large boulders, may now be dredged with ease. Loose gravel is probably the most favourable material to work in; but a powerful dredge will readily break up and raise indurated beds of gravel, clay, and boulders, and even find its way through the surf and soft bottom, though it will not penetrate very far into it. In such cases it is usual to alternate on the bucket-frame a bucket for raising the stuff, with a rake or pronged instrument for disturbing the bottom. The writer in his own experience has raised boulders weighing upwards of a ton with a powerful dredge of the ordinary construction, and removed the disintegrated or rotten rock at least to a limited depth, and he believes that in many cases the surfaces of submerged most of a may, by means of such appliances, be to some extent had seen cut up and removed, so as to obtain in certain Situations the H.M.S. "Vestigia." Considerable increase of depth, without recourse to steam working, which involves the investigation of large riversteam dredges is now an ocean basins. The main feature of the machine is the bucket-ladder, which is lowered through an arks formed in the vessel till it reaches the bottom. Along this ladder a series of buckets traverse which cut into the bottom at the lower extremity of the ladder and return loaded with the excavated material, which is discharged at the top of the bucket-ladder into a lighter or barge prepared for its reception. The machines are sometimes made with single and sometimes with double ladders, sometimes discharging at the stern of the vessel and sometimes at both sides, but it is obviously impossible to give illustrative drawings of the different forms of dredgers in sufficient detail to be practically useful. It may be stated that a first-class dredging machine to work in 30 feet water, and discharge over either side, of 60 horse-power complete, costs at present prices about £16,000 to £18,000. The steam hoppers employed to receive and remove the dredgings carry about 500 tons of excavations; they are 70 horse-power, and steam at about 9 miles per hour. The hopper, of course, can only be operated during the day, and may be opened when the place of deposit is reached, and the dredgings easily and quickly discharged. These steam barges cost about £8000. Large dredges, such as those constructed by Messrs Wingsate, for Glasgow for the Tyne and other places, will excavate at the rate of 450 tons per hour when working on a favourable ground.

Hopper Dredge.—Some improvements that have been suggested on the dredging plant hitherto used deserve notice. Among these may be mentioned that of Messrs Simons & Company, Renfrew, who have patented and constructed what they have called a hopper-dredge, combining in itself the advantages of a dredge for raising the material and a screw hopper vessel for conveying it to the place of discharge, both which services are performed by the same engines and the same crew. Messrs Simons have constructed seven hopper dredges on this plan, varying from 200 to 1000 tons of "hopper capacity."

Bulldredge.—Another of the recently suggested improvements is that by Mr C. Randolph, who, in 1870, proposed that, instead of the ordinary dredging buckets, pipes should be lowered until they come into contact with the sand or mud at the bottom. The tops of these pipes were to be in communication with powerful centrifugal pumps, so that the velocity of the in-drawing water through the pipes could be made so great as to carry with it a large percentage of the sand or mud from the bottom; and when the solid matter, and the water in which it is suspended, were raised to the desired height, they would flow freely to any required place for deposit of the suspended material. It is not known that this plan has been carried into practical operation.

Dredging at Amsterdam and Suez Canals.—Another arrangement is that of raising the material by buckets in the ordinary way, and, thereafter receiving it in a vessel and floating it off by pipes to the place of deposit. This, of course, can only be done where the place of deposit is close to the spot whence the material is dredged. Two plans have been proposed for effecting this. One of these has been used in the Amsterdam Canal, where the stuff is discharged from the buckets into a vertical cylinder, and is there mingled with water by a revolving Woodford-pump and sent off under pressure to the place of deposit in a semi-fluid state. At the Amsterdam Canal this was done by pipes made of timber, and hooped with iron rings. These wooden cylinders were made in lengths of about 15 feet, connected with leather joints, and floated on the surface of the water, conveying the stuff to the requisite distance, like the hose of a fire engine. It is, however, believed, of 4 or 5 feet, and depositing it over the banks of the canal. A somewhat similar process was employed.
on the Suez Canal.—not, however, by using pumps, but simply by running the stuff to the banks on steeply inclined shoots, which were supplied with water when the material raised did not contain sufficient water to cause it to run freely. It is obvious, however, that these arrangements can only be applied in situations where the material to be excavated is of a very soft nature, and where the place of deposit is close at hand. In keeping clear the Suez Canal such appliances may be very useful, as the soft deposit of the canal has only to be raised and projected over the banks on either side.

**American Dredges.**—Dredging in Canada and the United States is done by what are called *Dipper* and *Clam-shell* dredges, the bucket dredge being seldom used.

The *dipper dredge* consists of a barge, with a Derrick-crane reaching over the stern, suspending a large wrought-iron bucket which brings up the dredged material. To the bucket is attached a pole 6 inches by 4 inches in cross section, by which means it is guided while being drawn along the bottom; it is then raised, and its bottom being made to drop open, the contents fall into the barge moored alongside of the dredge. The bottom of the barge is kept closed by a catch, which, by means of a rope, can be withdrawn at the proper moment. The *clam-shell* is a box made of two similar pieces of wrought iron hinged together at one end; by a simple arrangement of the gearing the clamp, mouth open, drops down and is closed at the bottom, and the first effect of heaving up is to close it, thus imprisoning a quantity of material which is raised and deposited as in the case of the dipper. Both kinds of dredges are worked by a steam-engine, and rough as they appear to be, they are extensively employed in deepening and widening river channels, making or deepening canals, and other such works.

This is not the place to discuss the merits of different apparatus, which perhaps can only be settled by the actual performance of different arrangements when fully tested by practice. Having thus briefly noticed them, a few practical observations on dredging, as more immediately applicable to British rivers, have still to be mentioned.

**Longitudinal and Cross Dredging.**—In river dredging, two systems are pursued. One plan consists in excavating a series of longitudinal furrows parallel to the axis of the stream, the other in dredging cross furrows from side to side of the river. It is found that inequalities are left between the longitudinal furrows when that system is practiced, which do not occur, to the same extent, in side or cross *dredging*, and the writer invariably finds cross dredging to leave the most uniform bottom. To explain the difference between the two systems of dredging it may be stated that in either case the dredge is moved from the head and stern by chains about 250 fathoms in length. These chains in improved dredges are wound round windlasses worked by the engine, so that the vessel can be moved ahead or astern by simply throwing them into or out of gear. In longitudinal dredging the vessel is worked forward by the head chain, while the buckets are at the same time performing the excavation, so that a longitudinal trench is made in the bottom of the river. When the dredge has proceeded a certain length, it is stopped and permitted to drop down and commence a new longitudinal furrow parallel to the first one. In cross-dredging, on the other hand, the vessel is supplied with two additional moorings, one on each side, and these chains are, like the head and stern chains, wound round barrels wrought by the engine. In commencing to work by cross dredging, it may suppose itself to be at one side of the channel to be excavated. The bucket frame is set in motion, but, instead of the dredge being drawn forward by the head chain, she is drawn to the opposite side of the river by the side chain, and, having reached the extent of her work in that direction, she is then drawn a few feet forward by the head chain, and, the bucket frame being still in motion, the vessel is hauled across by the opposite chains to the side where she started. By means of this transverse motion of the dredge a series of cross furrows is made; she takes out the whole excavation from side to side as she goes on, and leaves no protuberances such as are found to exist between the furrows of longitudinal dredging, even where it is executed with great care. The two systems will be best explained by reference to fig 1, where A and B are the head and stern moorings, and C and D the side moorings, the arc of represents the course of the vessel in cross dredging, while in longitudinal dredging, as already explained, she is drawn forward towards A, and again dropped down to commence a new longitudinal furrow.

**Blasting combined with Dredging.**—In some cases, however, the bottom is found to be too hard to be dredged until it has been to some extent loosened and broken up. Thus at Newry, Mr. Bennie, after blasting the bottom in a depth of from 6 to 8 feet at low water, removed the material by dredging at an expense of from 4s. to 5s. per cubic yard. The same process was adopted by Messrs. Stevenson at the bar of the Erne at Ballyshannon, where, in a situation exposed to a heavy sea, large quantities of boulder stones were blasted, and afterwards raised by a dredger worked by hand at a cost of 10s. 6d. per cubic yard.

Sir William Cubitt also largely employed blasting in connection with dredging on the Severn, of which an instructive account is given in the Minutes of Proceedings of the Institution of Civil Engineers, from which the following particulars are taken—

1. Clay weighs about 105 lb. and sandstone about 155 lb. per cubic foot.

![Diagram](image-url)
coast at any time be done in one tide. The surface over which the blasting was done measured 800 yards in length by 200 yards in breadth, a small part of the surface being uncovered at low water. The depth obtained in mid-channel was 14 feet at low-water, the average depth of rock blasted being about 4 feet 6 inches. The holes, which were bored with the diamond drill, varied in depth from 7 to 9 feet, the distance between them being 18 feet. Dynes were filled in tin canisters fired by patent fuse was used as the explosive, the charges being 2 lb. and under. The rock is Oolite shale of variable hardness, and the average time occupied in drilling 5-feet holes was twelve minutes. The dredger raised the blasted rock,—the cost for blasting, lifting, and discharging at sea being about 4s. per cubic yard, including interest on dredging and other plant employed. The dredger sometimes worked a face of blasted material of from 7 to 8 feet. The quantity blasted was 110,000 cubic yards, and the contract for blasting so as to be lifted by the dredger was 3s. 1d. per cubic yard.

Dredging in Exposed Situations.—In some cases dredging has to be conducted in exposed situations such as the deepening of the "flats" at Londonderry and the bar at Carlisle. Messrs Stevenson found that dredging at the Foyle could not be conducted when the height of the waves exceeded 2½ feet; and Mr Barton at Dundalk so far confirms this, as he estimates a swell of 2 feet as the highest to work in.

Dredging on the River Clyde.—An important point connected with this subject is the cost at which dredging may be done when conducted on a large scale. This, of course, must depend on the character of the stuff to be raised and other circumstances; but the following information, kindly communicated by Mr James Deas, the engineer to the Trustees of the Clyde Navigation, cannot fail to be both interesting and useful.

Mr Deas says truly that the Clyde Trustees employ probably the largest dredging fleets of any trust in the kingdom, in maintaining and still deepening and widening the river to meet the ever-increasing demands of the shipping trade.

In the year 1871, for example, 904,104 cubic yards, or about 1,130,000 tons, were dredged from the river, of which 689,560 cubic yards were carried to sea by steam hopper barges, and 214,544 cubic yards was deposited on land by means of punts. Of this 904,104 cubic yards, 343,299 cubic yards were deposit from the higher reaches of the river and its tributaries, and from the city sewers, and 558,865 cubic yards new material. The total cost for dredging and depositing was £33,448, or about 9½ pence per cubic yard.

Owing to the difference in power of the dredging machines employed, and the character of the material lifted, the cost of dredging varies much. In 1871 the most powerful machine, working 24 hours, lifted 430,240 cubic yards of silt and sand at a cost of 2½ pence per yard; and this was deposited in Loch Long, 27 miles from Glasgow, by steam hopper barges, at 5½ pence per yard. On the other hand, another dredger, working 2605 hours, lifted only 26,720 cubic yards of hard gravel and boulder clay, at the cost of 20½ pence per cubic yard, which was deposited on the alveus of the river at the cost of 17½ pence per cubic yard; another, working 1831½ hours, lifted 122,664 cubic yards of silt, sand, and sewage deposit, at the cost of 5½ pence per cubic yard, which was deposited on land at the cost of 18½ pence per cubic yard; and another, working 2335 hours, lifted 65,160 cubic yards of till, gravel, and sand, at the cost of 5½ pence per cubic yard, which was deposited on the alveus of the river at the cost of 9½ pence per cubic yard.

The total quantity dredged from the river during the twenty-seven years prior to 1872 amounts to 13,617,000...
cubic yards, or upwards of 17,000,000 tons. The dredging plant of the Clyde Trust comprises—

- 6 steam dredges,
- 14 steam hopper barges,
- 1 steam-tug,
- 3 diving-bells,
- 270 pinte, and numerous small boats.

The expenditure for wages of crews, coal, and stores amounted in the year 1871 to fully £14,000, and for repairs £10,775. The value of the dredging plant employed is about £140,000.

Mr. Deas has also kindly furnished the following tables, from which the reader will see the gradual increase that has been made on the size of the dredging machines to meet the increased depth of water and growing necessity of increased accommodation for the larger class of vessels which now frequent the river.

### General Dimensions of Dredgers employed on the Clyde in 1872

<table>
<thead>
<tr>
<th>No.</th>
<th>Length</th>
<th>Breadth</th>
<th>Depth</th>
<th>Horse power</th>
<th>Stroke &amp; Stroke</th>
<th>Capacity of hopper</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1861</td>
<td>08</td>
<td>24</td>
<td>46</td>
<td>17</td>
<td>18</td>
<td>Double Punt-loading Machine</td>
</tr>
<tr>
<td>2</td>
<td>1841</td>
<td>09</td>
<td>22</td>
<td>20</td>
<td>15</td>
<td>12</td>
<td>Single Hopper Barge</td>
</tr>
<tr>
<td>3</td>
<td>1855</td>
<td>21</td>
<td>23</td>
<td>25</td>
<td>17</td>
<td>13</td>
<td>Single Hopper Barge</td>
</tr>
<tr>
<td>4</td>
<td>1855</td>
<td>10</td>
<td>20</td>
<td>23</td>
<td>17</td>
<td>13</td>
<td>Double Hopper Barge</td>
</tr>
<tr>
<td>5</td>
<td>1855</td>
<td>10</td>
<td>20</td>
<td>23</td>
<td>17</td>
<td>13</td>
<td>Single Hopper Barge</td>
</tr>
<tr>
<td>6</td>
<td>1855</td>
<td>10</td>
<td>20</td>
<td>23</td>
<td>17</td>
<td>13</td>
<td>Double Hopper Barge</td>
</tr>
<tr>
<td>7</td>
<td>1855</td>
<td>10</td>
<td>20</td>
<td>23</td>
<td>17</td>
<td>13</td>
<td>Double Hopper Barge</td>
</tr>
<tr>
<td>8</td>
<td>1855</td>
<td>10</td>
<td>20</td>
<td>23</td>
<td>17</td>
<td>13</td>
<td>Single Hopper Barge</td>
</tr>
<tr>
<td>9</td>
<td>1871</td>
<td>10</td>
<td>20</td>
<td>23</td>
<td>17</td>
<td>13</td>
<td>Double Hopper Barge</td>
</tr>
</tbody>
</table>

The following are the details as regards the dredgers and barges employed on the Clyde:

**No. 8 Dredger.**

- Length, 141 ft.
- Breadth, 29 ft.
- Depth, 10 ft.
- One bucket ladder, 90 ft. 9 in. between centres.
- Size of buckets, 3 ft. 3 in. x 3 ft. 2 in. x 1 ft. 11 in.
- When working in sand, can lift 190 cubic yards per hour.
- Greatest depth can dredge in, 28 ft.
- Working distance, 6 to 7 miles.
- Wages per day on 10 hours as under:
  - Master
  - Mate
  - Lionhearty
  - Fireman
  - Assistant do. and cook
  - Bow craneman
  - Stern craneman
  - Deck hands (2), each
  - Watchman
  - Coals
  - Tailors
  - Oil (lead)
  - Waste

**Steam Hopper Barge**

- Length, 145 ft.
- Breadth, 25 ft.
- Depth, 11 ft. 9 in.
- Engines, 40 horse power.
- Draught light (average), 5 ft. 4 in.
- Draught loaded, 11 ft.
- Speed, 8 to 9 miles per hour.
- Capacity of hopper, 250 cubic yards, or say 400 tons.
- Average distance run, loaded, 20 miles.
- Wages per day as under:
  - Master
  - Engineer
  - Fireman
  - Deck hands (2), each
  - Tailor
  - Oil (lead)
  - Waste

Quantity and cost of dredging done by No. 8 Dredger during year ending 30th June 1871:

- Wages £672 6 0
- Coal £37 10 0
- Repairs £175 1 0
- Interest and depreciation—£13,551.3 2 10 per cent

- Total £11,079 6 2

- Number of days worked during year, 256
- Engine hours 4,220
- Horse power 258
- Total cubic yards 2,964,806

Quantity and cost of conveying and discharging the total dredgers by Nos. 6 and 8 Dredgers during the year ending 30th June 1871:

- Wages, coal, and stores £697 8 0
- Repairs £25 2 9
- Interest and depreciation—£10,172 8 2
- Total £15,125 4 2

Abstract of the Quantity and Cost per Cubic yard of Dredging and Depending during the year ending 30th June 1871:

<table>
<thead>
<tr>
<th>No.</th>
<th>Nature of stuff, and where dredged generally</th>
<th>Total cubic yards</th>
<th>Price per cubic yard</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sand, and seaweed from Glasgow harbour</td>
<td>2,420</td>
<td>£1 2s 6d</td>
</tr>
<tr>
<td>2</td>
<td>Hard till, gravel, and sand, from Erskine Ferry, &amp;c</td>
<td>2,280</td>
<td>£1 6s 8d</td>
</tr>
<tr>
<td>3</td>
<td>Hard till, and clay, and sand, from Erskine Ferry, &amp;c</td>
<td>2,000</td>
<td>£1 6s 8d</td>
</tr>
<tr>
<td>4</td>
<td>Hard till, and clay, and sand, from Erskine Ferry, &amp;c</td>
<td>1,800</td>
<td>£1 6s 8d</td>
</tr>
<tr>
<td>5</td>
<td>Hard till, and clay, and sand, from Glasgow, &amp;c</td>
<td>1,650</td>
<td>£1 6s 8d</td>
</tr>
<tr>
<td>6</td>
<td>Hard till, and clay, and sand, from Erskine Ferry, &amp;c</td>
<td>1,500</td>
<td>£1 6s 8d</td>
</tr>
<tr>
<td>7</td>
<td>Hard till, and clay, and sand, from Erskine Ferry, &amp;c</td>
<td>1,350</td>
<td>£1 6s 8d</td>
</tr>
<tr>
<td>8</td>
<td>Hard till, and clay, and sand, from Erskine Ferry, &amp;c</td>
<td>1,200</td>
<td>£1 6s 8d</td>
</tr>
<tr>
<td>9</td>
<td>Hard till, and clay, and sand, from Erskine Ferry, &amp;c</td>
<td>1,050</td>
<td>£1 6s 8d</td>
</tr>
<tr>
<td>10</td>
<td>Hard till, and clay, and sand, from Erskine Ferry, &amp;c</td>
<td>900</td>
<td>£1 6s 8d</td>
</tr>
</tbody>
</table>

Total £12,000 0 0

No. 6 and 8 are punt-loading machines.

DRELCOURT, CHARLES (1560–1669), an eminent minister of the French Calvinistic church, was born at Sedan on the 10th July 1565. He studied first at the university of his native town, and afterwards at Saumur under the celebrated Professor Mark Duncan. In June 1618 he undertook the charge of the French Protestant church at Langres, where his ministrations were highly appreciated. The church, however, failed to receive the necessary royal sanction, and early in 1620 Drelincourt

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1. Contractor's price for discharging at Blythwood Park, including ship docks, and voyaging a distance of about 1 mile.
2. Discharging by Trustees' men on river banks near Erskine Ferry, by boating punts and wheeling.

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DRELCOURT, CHARLES (1560–1669), an eminent

* Contractor's price for discharging at Blythwood Park, including ship docks, and voyaging a distance of about 1 mile.
removed to Paris, where he was ordained minister of the church at Charenton. He was an popular and eloquent preacher, distinguished especially by his power of practically applying the words of Scripture. He was the author of a large number of works in devotional and polemical theology, several of which had great influence, and attained a very extensive circulation. His Catechism and his Consolations against the Fear of Death (Consolations contre les frayeurs de la mort) became well known in England by means of translations, which were very frequently reprinted. It has been said that Defoe wrote his fiction of Mrs Veal, who came from the other world to recommend the perusal of Drelincourt on death, for the express purpose of promoting the sale of an English translation of the work. His controversial works were very numerous. Directed entirely against Roman Catholicism, they did much to strengthen and consolidate the Protestant party in France. Drelincourt died on the 5th November 1669. In 1628 he had married the only daughter of a wealthy merchant, by whom he had a family of sixteen. Several of his sons were distinguished as theologians or physicians. The third, Charles, was dean of Armagh. ordained a physician to the prince of Orange; professor of physic in the university of Leyden, and became dean of Armagh.

DRESDEN, the capital of the kingdom of Saxony, is situated in a beautiful and richly cultivated valley on both sides of the Elbe, at an altitude of 402 feet above the level of the Baltic, 72 miles E.S.E. of Leipzig, and 116 miles S.E. of Berlin, in 51° 3' N. lat. and 13° 44' E. long. It is approached on almost every side through avenues of trees, and the distance is bounded by gentle eminences covered with plantations and vineyards. On the left bank of the Elbe are the Altstadt, with three suburbs, and Friedrichstadt (separated from the Altstadt by the Weisselitz, a small affluent of the Elbe); on the right the Neustadt and Antonstadt. Two fine bridges connect the Altstadt and Neustadt—one of them, the old bridge, erected 1727–31, being 1420 feet long, and having 16 arches. The other, built 1846–52, unites the railways on the right and left banks. The streets of the Altstadt are narrow and somewhat gloomy; those of the Neustadt wider and more regular. In 1875 there were 196,378 inhabitants, of whom 138,306 were on the left bank, 58,072 on the right. The vast majority of the population belong to the Lutheran Church.

On account of its delightful situation, and the many objects of interest it contains, Dresden is often called "the German Florence," a name first applied to it by Herder. The most imposing of the churches is the church of Our Lady, built 1726–45, with a cupola 311 feet high. The Roman Catholic church, built 1737–56, contains a magnificent organ by Silbermann, a number of statues by Mattielli, and pictures by Raphael Mengs, Sylvestre, and other artists. The church of St Sophia, begun in the 14th century, completed in the 16th, and restored in 1864–69, the Cross Church, the Russian church, and the synagogue are also noteworthy buildings. The Royal Palace, rebuilt 1734 by Duke George, surmounted by a tower 397 feet high, the highest in Dresden, is externally unattractive, but the interior is splendidly decorated. In the palace chapel are pictures by Rembrandt, Nicolas Poussin, Guido Reni, and Annibale Canacci. The Prince's Palace, built in 1715, has a fine chapel, in which are various works of Torelli; it has also a library of 20,000 volumes. The Zwinger, begun in 1711, and built in the Bococo style, forms an inclosure within which is a statue of King Frederick Augustus I. It was intended to be the vestibule to a palace, but now contains a number of collections of great value. Until 1846 it was open at the north side; but this space has since been occupied by the Museum, a beautiful building in the Renaissance style, the exterior of which is adorned by statues of Michelangelo, Raphael, Giotto, Dante, Goethe, and other artists and poets, by Rietschel and Hahnel. The Bruhl Palace was built in 1737 by Count Bruhl, the minister of Augustus II. Near it is the Bruhl Terrace, approached by a grand flight of steps, on which are groups, by Schilling, representing Morning, Evening, Day, and Night. The terrace commands a charming view of the Elbe and the surrounding country, and is a favourite promenade. The Japanese Palace, in the Neustadt, built in 1715 as a summer residence for Augustus II., receives its name from certain Oriental figures with which it is decorated; it is also sometimes called the Augusteum. Connected with it is a public garden, from which, as from the Bruhl Terrace, fine views are obtained. Among the remaining buildings of note may be named the guard-house, the arsenal, and the court theatre, an edifice in the Renaissance style, built since 1871 to replace the theatre burnt in 1869. In the Neustadt there is an equestrian statue of Augustus the Strong, erected in 1737. The public monuments of Dresden also include the Maurice Monument, a relief dedicated by the elector Augustus to the memory of his brother; a statue of Weber, the musical composer, by Rietschel; statues of King Frederick Augustus II. and Theodore Korner, by Hahnel; and the Rietschel monument, on the Bruhl Terrace, by Schilling.

The chief pleasure-ground of Dresden is the Grosser Garten, in which there are a summer theatre, the Rietschel Museum, and a château containing the Museum of Antiquities. The latter is composed chiefly of objects removed from the churches in consequence of the Reformation. Near the château is the zoological garden, formed in 1860, and excellently arranged. A little to the south of Dresden, on the left bank of the Elbe, is the village Racknitz, in which is Moreau's monument, erected on the spot where he was fatally wounded in 1813. The remains of Saxon Switzerland are seen from this neighbourhood.

On the right bank, the slopes of which are covered
with villas, there are several popular places of public resort.

Dresden owes a large part of its fame to its extensive artistic, literary, and scientific collections. Of these the most valuable is its splendid picture gallery, founded by Augustus II and increased by his successors at great cost. It is in the Museum, and contains about 3500 pictures, being especially rich in specimens of the Italian, Dutch, and Flemish schools. Among the Italian masters represented are Raphael, Titian, Coreggi, Leonardo da Vinci, Paolo Veronese, Andrea del Sarto, Guilio Romano, Annibale Carracci, Guido Reni, and Carlo Dolci. Of the Flemish and Dutch schools there are paintings by Rubens, Van Dyck, Rembrandt, and Ruysdael, Wouvermann, Dow, Teniers, Ostade, Potter, &c. The French school is represented, among others, by Poussin and Claude. The gem of the collection is Raphael's Madonna di San Sisto, for which a room is set apart. There is also a special room for the Madonnas of the younger Holbein. Other paintings with which the name of the gallery is generally associated are Coreggi's La Notte and Magdalen, Titian's Tribute Money and Venna; The Adoration and The Marriage in Cana, by Paolo Veronese; Andrea del Sarto's Abraham's Sacrifice, Rembrandt's Portrait of Himself with his Wife sitting on his Knee, The Judgment of Paris and The Boar Hunt, by Rubens; Van Dyck's Charles I, his Queen, and their Children. In separate compartments there are a number of crayon portraits, most of them by Rembrandt Carriera, and views of Dresden by Canaletto and other artists. Besides the picture gallery the Museum includes a magnificent collection of engravings and drawings. There are upwards of 350,000 specimens, arranged in twelve classes, so as to mark the great epochs in the history of art. A collection of casts, likewise in the Museum, is designed to display the progress of plastic art from the time of the Egyptians and Assyrians to modern ages. This collection was begun by Raphael Mengs, who secured casts of the most valuable antiquities in Italy, some of which no longer exist.

The Japanese Palace contains a public library of more than 300,000 volumes, with about 3000 MSS. and 20,000 maps. This library is especially rich in the ancient classics, and in works bearing on literary history and the history of Germany, Poland, and France. In the Japanese Palace there are also a valuable cabinet of coins and a collection of ancient works of art. A collection of porcelain, formerly in the Japanese Palace, but since 1876 in the "Museum Johanneum" (which once contained the picture gallery), is made up of specimens of Chinese, Japanese, East Indian, Sèvres, and Meissen manufacture, carefully arranged in chronological order. There is in the same building an excellent Historical Museum, in which there are many interesting relics of past times, besides objects which cast light on the history of races and of manners. In the Green Vault of the Royal Palace, so called from the character of its original decorations, there is an unequaled collection of precious stones, pearls, and works of art in gold, silver, amber, and ivory. The objects, which are about 3000 in number, are arranged in eight suites. They include the regalia of Augustus II as king of Poland; the electoral sword of Saxony; a group by Dunginger, in gold and enamel, representing the court of the Grand Mogul Aurungzebe, and consisting of 132 figures upon a plate of silver 4 feet 4 inches square; the largest onyx known, 63 inches by 23 inches; a pearl representing the dwarf of Charles II. of Spain; and a green brilliancy weighing 40 carats. Besides the Green Vault the Royal Palace has a gallery of arms, consisting of more than 2000 weapons of artistic or historic value. In the Zwinger are the Zoological and Mineralogical Museums, and a collection of instruments used in mathematical and physical science.

The two chief art institutions in Dresden are the Royal Academy of Arts, founded in 1764, and the Royal Choir. The Art Union, founded in 1828, which has a permanent exhibition in the Brühl Terrace, is a private body; and there are a good many other private art societies more or less distinguished. Dresden is also the seat of a number of well-known scientific institutions. The educational institutions of the town are both numerous and of a high order, including a technical college with a staff (in 1876) of 39 professors and teachers, three gymnasia, two real schools of the first class, and many schools of different ranks for popular education. The Catholics and Jews have schools of their own; and there are two seminaries for the education of teachers. Dresden has several important hospitals, asylums, and other charitable institutions.

Among the chief branches of industry are manufactures in gold and silver, turnery, straw plait, scientific and musical instruments, paper-hangings, artificial flowers, and painters' canvas. There are several large breweries; a considerable corn trade is carried on, and there is an extensive traffic in books and objects of art. A number of steam-ship companies provide for the navigation of the Elbe.

Dresden, which is known to have existed in 926, was of Slavonic origin. It became the capital of Henry the Illustrious, margrave of Meissen, in 1270, but belonged for some time after his death, first to Wenceslas of Bohemia, and next to the margrave of Brandenburg. Early in the fourteenth century it was restored to the margrave of Meissen. On the division of the territory in 1455, it fell to the Albertine line, which has since held it. Having been burned almost to the ground in 1491, it was rebuilt, and in the sixteenth century the fortifications were begun and gradually extended. John George I, in the seventeenth century, formed the Grosser Garten, and otherwise greatly improved the town, but it was in the first half of the 18th century, under Augustus I and Augustus II, who reigned as Poland, as well as electors of Saxony, that Dresden assumed something like its present appearance. The Neustadt, which had been burned down in the 17th century, was then rebuilt by Augustus I., and he also founded Friedrichstadt. The town suffered severely during the Seven Years' War, being bombarded in 1760. Some damage was also inflicted on it in 1813, when Napoleon made it the centre of his operations, one of the batteries and two arches of the old bridge were then blown up. The dismantling of the fortifications had been begun by the French in 1810, and was gradually completed after 1817, the space occupied by them being appropriated to gardens and promenades. Many buildings were completed or founded by King Anton, from whom Antonsdorf derives its name. Dresden again suffered severely during the revolution of 1848, but all traces of the disturbances which then took place were soon effaced. In 1866 it was occupied by the Prussians, who did not finally evacuate it until the spring of the following year. Since that time numerous improvements have been carried out, and between 1871 and 1875 the population increased at the rate of rather more than 11 per cent.

DREUX (Dureusca, Droic), a town of France in the department of Eure-et-Loir, on the Blaise, 21 miles north of Chartres. Noteworthy structures are the Gothic church of St Fere; the town-house, partly in the Gothic and partly in the Renaissance style, built in the 16th century, and the remains of a castle of the 12th century, situated on the hill overlooking the town, within the enclosure of which is a chapel commenced in 1516 by the dowager duchess of Orleans, and completed and adorned at great cost by Louis Philippe. The chief industries of Dreux are dyeing and silk-weaving, and the manufacture of jewellery, serge, hose, canoes, hats, and leather. In 1872 the population of the commune was 7418, of the town 6666.

Dreux was governed by counts in the Middle Ages. In 188 it was taken and burned by the English; and in 1562 Coligny and the Prince of Condé were defeated in its vicins. Montmorency was captured in 1563 Henry IV, captured the town after a fortnight's siege. Dreux was occupied by the Germans on October 9th, 1870, was subsequently evacuated, and was again taken, on November 17th, by General Von Treuschow.

DREW, SAMUEL (1765-1833), theologian, was born in the parish of St Austell, in Cornwall, March 3, 1765. Has
father was a poor farm-labourer, and could not afford to send him to school long enough even to learn to read and write. At the age of seven he lost his mother, a woman of superior mind and religious character; and he was then sent to work with the tanners. At ten he was apprenticed to a shoemaker, and at twenty he settled in the town of St. Austell, first as manager for a shoemaker; and about three years later he began business on his own account. He had already gained a reputation in his narrow circle as a keen debater and a jovial companion. He was first aroused to serious thought by the preaching of Adam Clarke; and the impression thus produced was deepened by the death of his elder brother. He now joined the Methodists, was soon employed as a class leader and local preacher, and continued to preach till a few months before his death. His opportunities of gaining knowledge were very scanty, but he strenuously set himself to make the most of them. It is stated that an accidental introduction to Locke's great essay determined the ultimate direction of his studies. In 1788 the first part of Bown's Age of Reason was put into his hands; and in the following year he made his first appearance as an author by publishing his Remarks on that work. The book was favourably received, and was republished in 1820. Drew had begun to meditate a greater attempt before he wrote his Remarks on Poins; and the fruits of his laborious investigation were given to the world in the Essay on the Immutability and Immortality of the Soul, in 1802. This work made him widely known, and his reputation in his narrow circle was already gained. His superior mind and religious character; and he was a debater and a powerful and successful orator. He was the first to put a complete needle-gun. A gunnery was opened by him about 1804, and in 1809 he was appointed editor of the Magazine, then newly established, and in 1821 to London, the business being then transferred to the capital. Here he filled the post of editor till his death, and had also the supervision of all works issued from the Caxton press. He was an unsuccessful competitor for a prize offered in 1811 for an essay on the existence and attributes of God. His success in that year, and which in his own judgment was his best, was published in 1820, under the title of An Attempt to demonstrate from Reason and Revelation the Necessary Existence, Essential Perfections, and Superintending Providence of an Eternal Being, who is the Creator, the Supporter, and the Governor of all Things (2 vols. 8vo.). This procured him the degree of M.A. from the university of Aberdeen. Among Drew's lesser writings are Life of Dr. Thomas Coke (1817), A History of Cornwall (1824), and a work on the divinity of Christ (1821). He died at Helston, in Cornwall, March 29, 1833. A memoir of his life by his eldest son appeared in 1834. 

DREYSE, JOHANN NICHOLAS VON (1787-1867), inventor of the needle-gun, was the son of a locksmith, and was born at Sommerda the 20th November 1787. He served his apprenticeship in the shop of his father, and from 1806 to 1809 followed his calling at Altenburg and Dresden. From 1809 to 1814 he was in Paris, where he succeeded in finding employment in the gun-factory of the Swiss officer Pauli, patronized by Napoleon I. Afterwards he returned to Sommerda, where, in partnership with Kronebich, he established a factory for the making of steel in place of iron by machine tools. In 1824 he patented a new percussion action for the gun, and continued thereafter to busy himself with experiments to improve in every way possible the process of shooting. In 1827 he invented the needle-gun, but without the advantage of breech-loading; and in 1836, having been encouraged in his undertakings by the Prussian Government, he invented his first complete needle-gun. A gunnery was opened by him in 1841, which ultimately supplied weapons for the troops of all the German states, and before his death employed about 1500 persons. In 1864 he and his family had the rank of nobility conferred on them. He died 9th December 1867.

DRIFIELD (or GREAT DRIFIELD, to distinguish it from the neighbouring hamlet of Little Driffield), a market-town of England, in the east riding of Yorkshire, 28 miles to the east of York, and 196 miles from London. The town—constituent of one parliamentary borough of the former county of the West Riding of Yorkshire—itself is now a smaller division of the larger of the two, and has received greater attention in modern times. The ancient fortifications, still extant in the beginning of the century, have almost completely disappeared; but of the four gateways, one named after St. Lawrence remains comparatively perfect, and there are considerable ruins of another. Great improvements have been effected in the town since 1847, under the invention and patent of Benjamin Whittworth, M.P., who built a town-hall at his own expense in 1855, and furnished half the funds necessary for the construction of the water-works which now supply 800,000 gals. daily. Among the public buildings are a mansion-house or mansion-house and towns-hall, the old linen-hall, a fine chapel, the old infirmary, a workhouse, and a hospital; five Protestant churches, five Roman Catholic chapels, three friaries, and four nunneries. St Peter’s Church formerly served as the cathedral of the Roman Catholic archbishopric of Armagh; and in the abbey of the Dominican monks there is still preserved the head of Oliver Plunkett, the archbishop who was executed at Tyburn in 1681 on an unfounded charge of treason. There was at one time an archbishopric in the town, built by Archbishop Hamilton about 1630; and the Dominicans, the Franciscans, the Carmelites, and the knights of St John had monastic establishments. Of the Dominican buildings there still exists the stately Magdalen tower; the Franciscan friary is a striking ruin; and there are traces more or less distinct of the Augustinian priory, the priory of St. Lawrence, and the hospital of St Mary. At the head of the educational institutions is a classical school endowed and maintained by the public charities are an almshouse for twenty-four aged widows, and a foundation providing houses and annuities for thirty-six clergyman’s widows. There is also a blue-coat school, founded about
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1727 for the education of freemen's sons. The present building was erected by T. F. Cairnes in 1870. The industrial establishments comprise a large cotton factory, erected by Mr Whitworth in 1864, four extensive saw-mills, three flax-mills, six flour-mills, eight tanneries, five salt-works, four soap works, two extensive breweries, two tanneries, chemical works, and a large engineering factory for the making of steam-engines, iron-bridges, &c. A brisk trade is carried on, especially with Liverpool (which is distant 133 miles due east), and with Glasgow. The harbour has been greatly improved by the company's expenses, and vessels of 20,000 tons can discharge at the quays. In 1873, 707, with a burden of 115,673 tons, entered the port, and the harbour receipts in 1871 were £3627. The tide reaches 2½ miles above the town to Oldbridge, and barges of 50 tons burden can proceed 1½ miles inland to Navan. The river is crossed by a bridge for ordinary traffic, and by a splendid railway viaduct. Assizes, quarter sessions, and petty sessions are held in the town; the parliamentary borough returns one member to Parliament, and the municipal borough is governed by a mayor, 6 aldermen, and 18 councillors. The population of the municipal borough (area, 454 acres) was 17,365 in 1831, 16,815 in 1851, 15,740 in 1861, and 15,510 in 1871. The whole population, with the exception of about 1105, are Roman Catholics. The inhabitants of the parliamentary borough, which has an area of 5765 acres, number 3635.

In the earliest notices the town of Drogheda is called Inver-Colpa or the Port of Colpa; the present name signifies "The Bridge over the River." In 1122 the place is mentioned as the seat of a synod convened by the papal legate, Cardinal Pappuro, in 1224 it was chosen by Lucas de Netterville, archbishop of Armagh, for the foundation of a Dominican friary, and in 1228 the two divisions of the town received separate incorporation from Henry III. But there grew up a strong feeling of hostility between Drogheda versus Oldbrowg. Mr. M. M., in consequence, the vessels landing there cargoes in the latter or southern town, to avoid the pontage duty levied in the former or northern town. At length, after much blood had been shed in the dispute, Philip Bennett, a monk residing in the town, succeeded by his eloquence, on the festival of Corpus Christi, 1412, in persuading the authorities of the two corporations to send to Henry IV. for a new charter sanctioning their combitions.

Drogheda has always been considered by the English a place of much importance. In the reign of Edward III it was closed along with Dublin, Waterford, and Kilkenny, as one of the four staple towns of Ireland. Richard II. received in its Dominican monastery the submission of O'Neal, O'Donnel, and other chieftains of Ulster and Leinster. The right of owing money was bestowed on the town several times held within its walls. In the reign of Edward IV. the mayor received a sword of state, and an annuity of £20. In recognition of the services rendered by the inhabitants at Malpass Bridge against O'Reilly, the still greater honour of having a university with the same privileges as that of Oxford remained a mere paper distinction, owing to the poverty of the town and the unsettled state of the country, and an attempt made by the corporation in modern times to resuscitate their rights proved unsuccessful. In 1496 Fergus's laws were enacted by a parliament held in the town. In the civil wars of 1641 the place was besieged by O'Neal and the Northern Irish forces; but it was gallantly defended by Sir Henry Tchoburne, and after a long blockade was relieved by the Marquis of Ormond. The same nobleman relieved it a second time, when it was invested by the Parliamentary army under Colonel James. In 1649 it was captured by Cromwell, after a short but spirited defence, and nearly every individual within its walls, with distinction of age or scene, was put to the sword. Thirty only escaped, which afterwards transported as slaves to Barbados. In 1690 it was garrisoned by King James's army, but after the decisive battle of the Boyne—the site of which, about three miles from the town, is marked by an obelisk 150 high,—it surrendered to the conqueror without a struggle, in consequence of a threat that quarter would not be granted if the town were taken by storm. Its subsequent history is purely of local interest.

DROHOBYCZ, a town of Austria, in the Galician circle of Sambor, on the Tysminka, a right-hand affluent of the Dniester, at the junction of a branch line from Borysław with the main Galician railway. It possesses a castle, a beautiful Roman Catholic church, a synagogue, and a German high school; and has inhabitants, who number upwards of 12,000, deal in cattle, grain, earthenware, leather, and salt,—the last being obtained from the local brine-wells.

DROITWICH, a municipal and parliamentary borough of England, in Worcestershire, on the Salwarpe, a left-hand tributary of the Severn, about seven miles by rail N.N.E. of Worcester. With the exception of its modern extensions, the town is built in a straggling and irregular fashion, but it numbers among its public edifices a court-chamber and market-house, two churches,—St Andrew's and St Peter's,—several chapels, and a hospital established by Lord Keeper Coventry, the revenues of which maintain about forty men and women, and educate about 100 young persons of both sexes. The principal occupation is the manufacture of the salt obtained from the brine springs, or segetes, to which the town probably owes both its name and its origin; and the annual quantity obtained is about 116,000 tons. These springs were known to the Romans, who had a station on the spot, as was shown by the remains of a villa, with some interesting and valuable relics, discovered during the formation of the Oxford and Wolverhampton railway. In Domesday-book mention is made of a tax levied on the salt, which must consequently have been manufactured in the 11th century. A charter was bestowed on Droitwich by King John. The population of the municipal borough, with its area of 1849 acres, was 3304 in 1871; that of the parliamentary borough, with its area of 27,577 acres, was 9510.

DROME, a department in the south-east of France, formed of parts of Dauphiné and Provence, is bounded W. by the Rhone, which separates it from Ardèche, N. and N.E. by Isère, E. by Hautes Alpes, S.E. by Basses-Alpes, and S. by Vaucluse, and lies between 44° 15' and 5° 15' E. long. To the east it is covered by spurs of the maritime Alps, one of the largest of which forms part of its eastern boundary, and throws off ridges, mostly wooded, that run east and west with tolerable regularity. These ridges divide the department in its whole extent into three great valleys, having a general slope westward to the Rhone, namely, that of the Isère in the north, that of the Drôme, which occupies the central part of the province, and that of the Auvèze, in the south. The Rhone and Isère are both navigable. The former receives the whole of the drainage of the department. The soil consists of clays and argilaceous sand with rolled pebbles. The irrigation canals are numerous. The climate, except in the valleys bordering the Rhone, is rather cold, but on the whole breezy and healthy. Snow is visible on the mountain-tops during the greater part of the year. The principal forest-trees are the pine, beech, and oak. In the valleys flourish the olive, chestnut, vine, almond, mulberry, nut, and other fruit trees, and wheat and madder are grown. Black truffles are abundant. Besides agriculture the principal industries are the rearing of silk-worms and sheep, and the manufacture of waxes, the best of which are the red and white Ermitage, of woollen, cotton, and dyed linen goods, spun and woven silk, paper, oil, ropes, earthenware, and leather. The wool and wood trades are considerable. The mineral products include iron, copper, lead, lignite, marble, granite, black and red potter's clay, mullite, chalk, and cement-stone. Drôme is divided into the arrondissements of Valence, Die, Montélimart, and Nyons, comprising 29 cantons and 366 communes. The capital is Valence. Of the total area of 652,155 hectares (1,610,825 acres) about 514,227 acres are arable, 418,576 meadows, 49,203 meadow. The population in 1872 was 320,417.

DROPSY (contrasted from the old word hydroscopy, from the Greek ὕδρος ὑποπλεσία, water, and ὑδρό, the appearance) signifies a collection of simple aqueous fluid in all or any of the cavities of the body, or in the meshes of its tissues. Dropsy of the subcutaneous connective tissue is termed edema when it is localized and limited in extent; when more diffuse it is termed anasarca; the term edema is also applied to dropsey of some of the intravascular organs, notably to that of the lungs. Hydro-ploraedse signifies an accumulation of fluid within the ventricles of the brain or in the arachnoid cavity; hydrothorax, a collection of fluid in one or both pleural cavities; hydropericardium, in the pericardium; ascites, in the peritoneum; and, when anasarca is conjoined with the accumulation of fluid in one or more of the serous cavities, the dropsey is said to be general.

Dropsey is essentially a symptom and not a specific disease, and ought not to be confounded with inflammatory exudations of a serious character. The transudation is a mere filtrate from the blood produced by increased intravascular pressure, of local or general origin, and occurring through the walls of the capillaries or smaller venules. Its specific gravity varies from 1.008 to 1.014; it is alkaline, occasionally neutral, very rarely feebly acid; it is not the liquor sanguinis, but merely water held in solution a varying proportion of the constituents of the blood serum, chiefly a saline constituent, and those notably of chlorides of sodium, occasionally urea, sometimes cholestrine, always more or less albumen, and a proportionate amount of fibrinous matter. It may be colourless, greenish or reddish from the presence of blood pigment, or yellowish from the presence of bile pigment; transparent, or opalescent, or milky from the presence of fatty matter or of the chloride of sodium, occasionally varying proportion of the constituents of the blood serum, accompanied by escape of albumen; these are the acute congestive form of dropsy, with the accumulation of fluid in one or more of the serous cavities, the dropsey is said to be general.

Dropey is often very considerable, and in the absence of cardiac derangements will be found to appear first about the loose cellular tissue surrounding the eyes, where the vessels, turgid with watery blood, have less efficient support. Dropsey, though often a terminal and always a serious symptom, is yet one which much can be done to ameliorate and in many cases to remove, and this is particularly the case in many local dropseyes and in those of cardiac origin. Lung, kidney, and hepatic dropseyes are less amenable to treatment; yet one case of ascites is on record in which a perfect recovery took place after the woman had been tapped 133 times, and nearly 400 gallons of fluid removed. Diuretics and purgatives are the remedies chiefly employed; but in certain cases diaphoretic and particularly the use of a hot air bath are very effectual, and in a large number paracentoses or tapping is either indispensable, or at events much expedites the cure.

It may be well to mention that there are certain affections which may be termed apurineo dropsey, such as ovarian dropsey, which is only a cystic disease of the ovary; hydroptisis, dropsey of the uterus, due to inflammatory occlusion of the ductus of Hchimpheo, dropsey of the kidney, due to obstruction of the ureter, and subsequent distention of these organs by serous accumulations; other hollow organs may also be similarly affected.

DROSTE-HULSHOFF, Annette Elisabeth, Baroness (1798-1848), a German poetess, was born on an estate of Hulshoff, near Munster, and belonged to the elder branch of the Catholic Westphalian family which about the same time had its reputation increased by the juridical labours of Clemens Augustus von Droste-Hulshoff. She received an education of a more scientific character than usually fell to her sex; and the delicate state of her health obliged her to lead a very quiet and sequestered life, which in its turn fostered the natural sensibility of her temperament, and increased her devotion to literature and study. With the exception of a short time spent at Cologne and Bonn about 1825, she mainly resided at her mother's country seat of Rischhaus, near Munster; but in 1841 she went to the castle of Eyphhausen, in Thuringia, and in 1844 became a guest at the house of her brother-in-law Von Lasaberg, on the borders of the Lake of Constance. She had just purchased an estate in that neighbourhood when she died in May 1848. Besides a volume of Gedichte published during her lifetime (Stuttgart, 1844), we have also from her pen Das geistliche Jahr, nebst einem Anhang religiöser Gedichte, Stuttgart, 1852; and Letzte Gedichte, Hanover, 1860. The popularity of the first work is shown by a third edition in 1873. The characteristics of the author are great perfection of form, delicacy of feeling, and vivid realization of external nature. A number of her poems have been rendered into English by Medwin. See Schucking, Annette von Droste-Hulshoff, Ein Lebensbild, 1871.

DROUAIJS, Jean Germain (1763-1788), a French historical painter, was born at Paris on the 25th November 1763. His father, Henri Drouais, and his grandfather, Hubert Drouais, were well-known portrait painters; and it was from his father that he received his first artistic instruction. He was afterwards instructed to the care of Breaet, an excellent teacher, though his own pictures did not take
high rank. In 1780 David, who had just returned from Rome, opened a school of painting in Paris, and Drouet was one of his earliest and most promising pupils. He adopted the classical style of his master, and gave his whole time to study—painting during the day, and spending a great part of every night in designing. For weeks together it is said that he never left his studio. In 1783 he was admitted to compete for the great prize of painting offered by the Academy, the subject being the Widow of Nain. After inspecting the works of his fellow-contestants, however, he lost hope and destroyed his own canvas, but was censured by the assurance of his master David that he had not done so as he would have won the prize. Next year he was triumphantly successful, the picture of the Woman of Canaan at the Feet of Christ, with which he gained the prize, being judged by competent critics to be worthy of comparison with the works of Poussin. He was carried should high by his fellow-students through the streets to his mother's house, and a place was afterwards found for his picture in the Louvre. His success making him only the more eager to perfect himself in his art, he accompanied David to Rome, where he worked even more assiduously than in Paris. He was most strongly influenced by the remains of ancient art and by the works of Raphael. Goethe, who was at Rome at the time it was finished, has recorded the deep impression made by his picture of Marius at Minturno, which he characterizes as in some respects superior to the work of David, his master. The last picture which he completed was his Philoctetus on the Island of Lemnos. He died of fever on the 15th July 1788. A monument in his memory was erected by his fellow-students in the church of Santa Maria in the Via Latina.

DROUET, JEAN BAPTISTE (1763-1824), one of the Terrorists of the first French Revolution, chiefly noted for the part he played in the arrest of Louis XVI. at Varennes, was born at Sainte-Menouhould in 1763. He served for seven years in the army, and afterwards assisted his father, who was post-master of his native town. The carriages conveying the royal family on their flight to the frontier stopped at his door on the evening of June 21, 1791; and the passengers, travelling under assumed names, were recognized by Drouet, who immediately took his picture of Marius at Minturno, which characterizes as in some respects superior to the work of David, his master. The last picture which he completed was his Philoctetus on the Island of Lemnos. He died of fever on the 15th July 1788. A monument in his memory was erected by his fellow-students in the church of Santa Maria in the Via Latina. Drouet took a brilliant part in the siege of Dantzic, and signed the capitulation of the town, he fought at Mohrungen, and was severely wounded at Friedland (1807). After this battle he was made grand officer of the Legion of Honour, was created Count d'Erlon, and received a pension. He afterwards served with distinction in the Peninsula War, and defeated General Hill at the Col de Mayo. After the first Restoration he was named commander of the 16th military division. He presided at the council of war, at Lille, which acquitted General Exelmans, but in March 1815 he was arrested on suspicion of treason, and suffered a short imprisonment. He was present under Napoleon at Waterloo, and was severely reproached by the emperor for not bringing his division into action. After the second Restoration he quitted France, and did not return till 1825. He was appointed governor of Algeria in 1834, was created marshal of France in 1843, and died at Paris January 25, 1844.

DROWING is one of the various forms of death from suffocation, the asphyxiating agent being water; and, accordingly, all the special characteristic of drownings are asphyxia or apnoea are present—varying in intensity according to the manner of the death, whether it has or has not been attended with violent struggling. In addition, owing to the medium in which the death occurs, certain other symptoms specially characteristic of drowning are absent.

By older authors a peculiar form of death by drowning was described, in which the appearances of asphyxia were wanting, and also the special signs of this form of death. To this the name of synopal asphyxia was given. Hence, in treating of drowning, descriptions of these two forms were given, and in the case of bodies recovered from the water death was said to have occurred either from asphyxia or from syncope. Now, undoubtedly it often happens when persons fall or are thrown into the water that, in consequence of fright or of the shock sustained by violent contact with the surface of the water, no effort is made to save themselves, and death rapidly ensues from syncope. In such cases none of the characteristic signs of drowning are found, and, so far as the examination of the body is concerned, it is impossible to decide upon the exact cause of death. It is quite within the bounds of possibility that in such cases death may have been effected by other means, and the body have been thrown into the water to conceal the true cause of death.

No such uncertainty, however, attends the investigation of a case of drowning by true asphyxia, as it was called. The drowned individual struggles to reach the surface of the water in his efforts to respire, as he does so he draws water into his windpipe which provokes cough. This expels the air from his lungs, and the water which threatened to suffocate him; and as he sinks, in his struggles he endeavours again to respire, but now draws water into his mouth which chokes him, and can only be got rid of by swallowing. Insensability then comes on, and death rapidly but painlessly ensues from a true asphyxia.

If the body be recovered—say within two hours—it is relaxed, and generally presents a palid appearance. The face is slightly congested, the features placid and composed. The lips are livid, and the tongue is either protruded from the mouth, firmly grasped by the teeth, or it is protruded closely to the dental arch with the teeth' service, re-erected by the body. In 1782, and two years later became aide-de-camp to General Lefèvre. He served at the sieges of Valenciennes, Quenouy, and Condé, and under Hoche at the blockade of Ehrenbreitstein. As general of brigade (1799) he fought at Zurich, at the bridge of Schaaffhausen, and at the taking of Constance. In August 1800 he was promoted general of division. He distinguished himself at Ulm and Hohenlinden, and by a skilful manœuvre decided the victory of Jena (1806). Drouet took a brilliant part in the siege of Dantzic, and signed the capitulation of the town, he fought at Mohrungen, and was severely wounded at Friedland (1807). After this battle he was made grand officer of the Legion of Honour, was created Count d'Erlon, and received a pension. He afterwards served with distinction in the Peninsula War, and defeated General Hill at the Col de Mayo. After the first Restoration he was named commander of the 16th military division. He presided at the council of war, at Lille, which acquitted General Exelmans, but in March 1815 he was arrested on suspicion of treason, and suffered a short imprisonment. He was present under Napoleon at Waterloo, and was severely reproached by the emperor for not bringing his division into action. After the second Restoration he quitted France, and did not return till 1825. He was appointed governor of Algeria in 1834, was created marshal of France in 1843, and died at Paris January 25, 1844.
which takes place more or less in all forms of death. On the thighs the skin presents a roughened appearance, owing to the unusual development of the papilla, and to this the name of cutis verrucosa, or goose-skin, has been applied. Among the external signs which we are passing in review the state of the hands and fingers merits special attention. In his dying agony the drowned individual spasmodically clutches for help in all directions, and, should it be a point or a canal to which he has fallen, his nails may be injured, sand or mud may be found beneath them, and, firmly grasped in the hand, may be vegetable structures from the sides or the bottom of the pond; or, on the other hand, his fingers may present traces of recent injury.

Internally, the usual signs of asphyxia or apnea are well marked. These are:—(1) A distorted condition of the right cavities of the heart with dark fluid blood, while the left are well contracted, and are either empty or contain only a small quantity of dark-coloured blood. (2) The lungs are developed, and highly congested. On their being incised, the cut surfaces on pressure give out dark-coloured blood and frothy mucus in large quantity. (3) There is congestion of the mucous lining of the air passages; and (4) dark colour and fluidity of the blood through the body.

Among the signs specially characteristic of this form of death are:—(1) An unusual quantity, and to this the stomach (amounting to one or two pints), which can only be accounted for by water having been swallowed during the last agonies of death. In many cases this cannot be determined with any degree of certainty, the fluid found incised, the cut surfaces on pressure give out dark-coloured blood and frothy mucus in large quantity. (2) The lungs are well contracted, and this, together with any water that may have entered, is churned up along with the verdigris of the body, but, owing to the rapid development of gas in all the soft structures of the body, but especially in the intestines, the body quickly comes to the surface of the water, and decomposition proceeds with great rapidity. All the canals of the body are relaxed, and the pressure of gas is such as to force the froth from the air passages, the water from the stomach, and the blood from the heart.

Almost never,” says Devéeger, the great authority on the effects of putrefaction in the drowned, “can the signs of drowning during life be determined in summer, so quick is the gaseous putrefaction.” Hence, too great caution cannot be exercised by the medical jurist in giving a positive opinion in such cases.

It is remarkable that the progress of putrefaction in persons who have died by drowning should differ widely
from that of the same process in other forms of death. In ordinary cases, the first signs of putrefaction manifest themselves in the lower parts of the abdomen. The rest of the trunk is attacked, then the extremities, and lastly the face. In drowning, on the contrary, the first part of the body to show evidence of decay is the face, and in the course of a few hours, so rapid is the advance of the putrefactive process, that it becomes utterly impossible to recognize the features. Hence it is that it has been chiefly in cases of drowning that difficulties have arisen as to identification, in consequence of that part of the body by which persons are most readily recognized undergoing alteration so rapidly. Devergie, who, from his official connection with the Morgue at Paris, enjoyed unusual facilities for watching the various stages of putrefaction in the drowned, has carefully described them, and we now proceed to give a résumé of his observations. The 1st stage includes a green discoloration of the skin, first noticed on the face and neck, which gradually extends over the body. The 2d is the evolution of gas, distending the abdomen, and causing those changes to which we have already adverted. The 3d is that of brown putrefaction, which affects all the parts of the body previously coloured green. The 4th is that of putrification. The discoloured parts soften, liquefy, and disappear. Under such circumstances the body rapidly decays, and the bones fall asunder. On the other hand, in cool weather the process of liquefaction is arrested, and the soft parts become solidified, owing to their conversion into adipocere, a peculiar kind of animal soap. To this stage— the 6th—Devergie gives the name of saponification. The 6th stage is termed desiccation, or drying, from the continued removal of the fluids from the body, which, thus hardened, is liable, from the action of the elements, to undergo corrosion, and, at the same time long immersion leads to the formation of various incrustations. Devergie treats of these two conditions under the heads of corrosion and incrustation. In the 9th and last stage we have the destruction of the soft parts generally. In the liquid decomposition the part of the body first attacked was the face, and the same order is observed in the later stages—the soft parts of the face, now hardened by their transformation into adipocere, fall off, and leave nothing but a grinning skeleton of a face behind, the rest of the body being comparatively perfect. This peculiar progress of the process of decomposition in the drowned explains the cases recorded of apparently decapitated heads, and of bodies consisting of headless trunks, having been found floating in the sea. These stages of the putrefactive process Devergie states do not follow any definite order or period of sequence, and each case demands careful investigation as to the condition of the body and the time of the year when the drowning occurred, but as the result of his experience he finds that the respective seasons of summer and winter make at least a month's difference in the period at which the earlier changes occur.

As to the treatment of the drowned, a complete revolution has in recent times taken place in its details. To induce a renewal of the inspiration it was formerly recommended that air should be forcibly introduced into the lungs by means of a pair of bellows, and, according to the older directions of the Humane Society, the body was "to be well shaken every ten minutes in order to render the process of animation more certain." These expedients proved singularly ineffective except in cases where the other proposals of the society, such as rubbing and the application of warmth, would of themselves have procured recovery. In 1856 Dr Marshall Hall devised his ready method or postural treatment of the asphyxiated, and by actual results in cases of stillbirth and of drowning, proved that respiration could be imitated by simply changing the position of the body. Since then Dr B. Silvester has suggested a still more simple plan of postural treatment which, along with that of Dr Marshall Hall, has been adopted by the Humane Society and also by the National Life Boat Institution, from whose published directions we give the modern treatment of the drowned by both methods, which is in use in Her Majesty's Fleet, in the Coast-guard Service, and at all the stations of the British Army at home and abroad.

**DIRECTIONS FOR RESTORING THE APPARENTLY DROWNED.**

I. **Send immediately** for medical assistance, blankets, and dry clothing, but proceed to treat the patient **instantly** on the spot, in the open air, with the face downward, whether on shore or afloat, exposing the face, neck, and chest to the wind, except in severe weather, and removing all tight clothing from the neck and chest, especially the braces. The points to be aimed at are—first and immediately, the restoration of breathing, and secondly, after breathing is restored, the promotion of warmth and circulation. The efforts to restore breathing must be commenced immediately and energetically, and persevered in for one or two hours, or until a medical man has pronounced that life is extinct. Efforts to promote warmth and circulation, beyond removing the wet clothes and drying the skin, must not be made until the first appearance of natural breathing, for if circulation of the blood become endangered before breathing has recommenced, the restoration to life will be endangered.

II. **To Restore Breathing.**—To clear the throat. Place the patient on the floor or ground with the face downwards, and one of the arms under the forehead, in which position all fluids will more readily escape by the mouth, and the tongue itself will fall forward, leaving the entrance into the windpipe free. Assure this operation by wring and cleansing the mouth. If satisfactory breathing commences, use the treatment described below to promote warmth. If there be only slight breathing, or no breathing— or if the breathing fail, then—

*To excite breathing.*—Turn the patient well and instantly on the side, supporting the head, and excite the nostrils with snuff, h Ars.

**Fig. 1**—Inspiration (Dr Marshall Hall's method).

**Fig. 2**—Expiration (Dr Marshall Hall's method).

horn, and smelling salts, or tickle the throat with a feather, &c. if they are at hand. Rub the chest and face warm, and dress cold water, or cold and hot water alternately, on them. If there be no success, lose not a moment, but instantly—

*To stimulate breathing.*—Replace the patient on the face, raising and supporting the chest well on a folded coat or other article of dress. Turn the body very gently on the side and a little beyond, and then slowly on the face, back again, repeating these movements cautiously, efficiently, and perseveringly, about fifteen times in the minute, or once every four or five seconds, occasionally varying the position of the chest, and by actual results in cases of stillbirth and of drowning, proved that respiration could be imitated by simply changing the position of the body. Since then Dr B. Silvester has suggested a still more simple plan of postural treatment which, along with that of Dr Marshall Hall, has been adopted by the Humane Society and also by the National Life Boat Institution, from whose published directions we give the modern treatment of the drowned by both methods, which is in use in Her Majesty's Fleet, in the Coast-guard Service, and at all the stations of the British Army at home and abroad.
and air enters the chest.) On each occasion that the body is replaced on the face, make uniform but efficient pressure with break movement on the back between and below the shoulder-blades or bones on each side, burning the presence immediately before turning the body on the side. During the whole of the operations let one person attend solely to the movements of the head and of the arm placed underneath. (This last increases the expansion—the second commences inspiration.) The result is respiration or natural breathing, and, if not too late, life. While the above operations are being proceeded with, dry the hands and feet, and as soon as dry clothing or blankets can be procured, strip the body, and cover or gradually reclothe it, but taking care not to interfere with the efforts to restore breathing. III. Should these efforts not prove successful in the course of from two to five minutes, proceed to imitate breathing by Dr Silvester's method, as follows. Place the patient on the back on a flat surface, inclined a little upwards from the feet; raise and support the head and shoulders on a small firm cushion or folded article of dress placed under the shoulder-blades. Draw forward the patient's tongue, and keep it projecting beyond the lips; an elastic band over the tongue and under the chin will answer this purpose, or a piece of string or tape may be tied round them, or by raising the lower jaw, the teeth may be made to retain the tongue in that position. Remove all tight clothing from about the neck and chest, especially the braces.

**FIG. 3.**—Inspiration (Dr Silvester's method).

**FIG. 4.**—Expiration (Dr Silvester's method).

To imitate the movements of breathing—Standing at the patient's head, grasp the arms just above the elbows, and draw the arms gently and steadily upwards above the head, and keep them stretched upwards for two seconds. (By this means air is drawn into the lungs.) Then turn down the patient's arms, and press them gently and firmly for two seconds against the sides of the chest. (By this means air is pressed out of the lungs.) Repeat these measures alternately, deliberately, and perseveringly, about fifteen times in a minute, until a spontaneous effort to respire is perceived, imme- diately upon which cease to imitate the movements of breathing, and proceed to induce circulation and warmth.

IV.—TREATMENT AFTER NATURAL BREATHING HAS BEEN RESTORED. To promote warmth and circulation—Commence rubbing the limbs upwards, with firm grasping pressure and energy, with handkerchiefs, flannels, &c. (By this the blood is propelled along the veins towards the heart.) The friction must be continued under the blankets or over the dry clothing. Promote the warmth of the body by the application of hot flannels, bottles, and muffs of hot water, heated bricks, &c., to the pit of the stomach, the arms, between the thighs, and to the soles of the feet. If the patient has been carried to a house after respiration has been restored, be careful to let the air play freely about the room.

On the resumption of natural breathing, warm brandy and water should be given; and then, if the power of swallowing has returned, small quantities of wine, warm brandy-and-water, or coffee should be administered. The patient should be kept in bed, and a disposition to sleep encouraged.

**GENERAL OBSERVATIONS.**—The above treatment should be persevered in for some hours, as it is an erroneous opinion that persons are irrevocably dead because life does not soon make its appearance, persons having been restored after persevering for many hours. The appearances which generally accompany death are the following—breathing and the heart's action cease entirely; the eyelids are generally half closed; the pupils dilated; the tongue approaches to the under edges of the lips, and these, as well as the nostrils, are covered with a frothy mucus; coldness and pallor of surface increase. The following cautions should be attended to:—Prevent unnecessary crowding of persons round to body, especially in an apartment. Avoid rough usage, and do not allow the body to remain on the back unless the tongue is secured. Under no circumstances hold the body up by the feet. On no account place the body in a warm bath unless under medical direction, and even then it should only be employed as a momentary measure.

Dr Silvester's method is more generally practised than that of Dr M. Hall,—its special advantages being that it commences by imitating inspiration, and more completely distends the chest. But we are of opinion that the combination of the two methods as recommended above should undoubtedly be practised in every case.

It has frequently been pointed out that in fatal cases of drowning the right auricle of the heart is very much detached, and it has been plausibly urged by Professor Struthers of Aberdeen (Edinburgh Medical Journal, 1857, p. 418) that the movements of respiration may be successfully imitated, and air may enter the lungs, and yet the persons may not recover in consequence of the stoppage of the action of the heart. He recommends that blood should be drawn from the external jugular vein, so as to relieve the engorged auricle, which, from its distension, is paralyzed. The abstraction of a small quantity of blood is all that is required to effect this—from half to one or two tablespoonfuls. Finally, as a last resource, galvanism must be had recourse to. Both this and the blood-letting must be practised by a qualified medical man; but it is important to know that the methods of Dr Hall and Dr Silvester can easily be learned by any one, and that, if early and perseveringly applied, they are attended with a large measure of success. The treatment must be continued for at least eight hours, there should be an absence of extreme pallor, and while any heat of the body remains. The question of the treatment of the drowned cannot be regarded as definitely settled, and the plans of Hall and Silvester have from time to time been subjected to criticism. Among the latest suggestions is that of Dr B. Howard of America, who, by means of what he terms his "direct" method, which mainly consists in pressure of the chest from above (the patient being placed on his back), claims that air is more easily introduced into the lungs, and that the expansion and contraction of the chest are more perfectly attained (see Lancet, August 11, 1877).

At the meeting of the British Medical Association at Manchester 1877, Dr Howard practically demonstrated his plan on the living subject, and there can no doubt that involuntary respiration was readily produced. Further evidence, however, is necessary from actual cases of suspended animation.


DROZ, FRANÇOIS-XAVIER JOSPEH (1773-1850), a French writer on moral and political subjects, was born on October 31, 1773, in the city of Besançon, where his family had furnished men of considerable mark to the legal profession. He was also trained in the law and by his own legal studies led him to Paris in 1802. On the very day after the dethronement of the king, and was present during the massacres of September; but on the declaration of war he joined the volunteer battalion of the Doubs, and for the next three years served in the army.
of the Rhine. Receiving his discharge on the score of ill health, he soon after obtained a much more congenial post in the newly-founded école centrale of his native city, and in 1799 he made his first appearance as an author by an Essai sur l'art ornateur, Paris, Fructidor, An VII, in which he acknowledged his indebtedness more especially to Hugh Blair. This early reference to Scottish literature is interesting in connection with the peculiarly Scottish tone of mind which is observable in his writings, and has attracted the notice of Sainte-Beuve. Removing to Paris in 1803, he became intimate not only with the like-minded Ducis, but also with the sceptical Calzas; and it was at the philosopher's advice that, in order to catch the public ear, he produced the romance of Luna, which Sainte-Beuve has characterized as a muddled echo of Florian and Werther. Like several other literary men of the time, he obtained a post in the revenue office known as the Drouts réunis, then under the control of M. François of Nantes; but from 1814 he devoted himself exclusively to literature and became a contributor to various journals. Already favourably noticed by his Essai sur l'art d'être heureux, Paris, 1806, his Éloge de Montaigne, 1813, and his Essai sur le beau dans les arts, 1815, he not only gained the Montyon prize in 1823 by his work De la philosophie morbide ou des différents systèmes sur la science de la vie, but also in 1824 obtained admission to the Académie Française. The main doctrine enunciated in this treatise is that society will never be in a proper state till men have been educated to think of their duties and not of their rights. It was followed in 1825 by Application de la morale à la philosophie et à la politique, and in 1829 by Économie politique, ou principes de la science des fraudes, a methodical and clearly written treatise, which has had the honour of being edited by Michel Chevalier in 1854. His next and greatest work was a Histoire du régime de Louis XVI. (3 vols. Paris, 1838-1842), the result of very careful and prolonged study, and marked by greater vigour of style and deeper powers of thought than he had previously displayed. As he advanced in life Droz had become more and more decidedly religious, and the last work of his prolific pen was Pensees du Christianisme, 1842. Few have left so blameless a reputation: in the words of Sainte-Beuve, he was born and he remained all his life the man of the good and the just.


**DRUIDISM**, the name usually given to the religious system of the ancient Gauls and Britons. The word Druid, one form or other of which is used in early Celtic records to designate a class of priests corresponding to the Megri or wise men of the ancient Persians, is of uncertain etymology. The derivation from the Greek δρυς, an oak, though as old as the days of the elder Pliny, is probably fanciful.

We find in Caesar the first and at the same time the most circumstantial account of the Druids to be met with in the classical writers. In the digression on the manners and customs of Gaul and Germany which occupies a portion of the sixth book of his Gallic war, he tells us that all men of any rank and dignity in Gaul were included among either the Druids or the nobles. The former were the religious guides of the people as well as the chief expounders and guardians of the law. On those who refused to submit to their decisions they had the power of inflicting severe penalties, of which excommunication from society was the most dreaded. As they were not a hereditary caste, and enjoyed exemption from service in the field as well as from payment of taxes, admission to the order was eagerly sought after by the youth of Gaul. The course of training to which a novice had to submit was protracted, extending sometimes over twenty years. All instruction was communicated orally, but for certain purposes he had a written language in which they used the Greek characters. The president of the order, whose office was elective and who enjoyed the dignity for life, had supreme authority among them. They taught that the soul was immortal. Astrology, geography, physical science, and natural theology were their favourite studies. Britain was the head-quarters of Druidism, but once every year a general assembly of the order was held within the territories of the Carnutes in Gaul, probably in the neighbourhood of the modern Dreux. The Gauls in extreme cases offered human sacrifices, usually criminals. Their chief deity was identified with Caesar with the Mercury of the Romans. Writing a few years later, Cicero, in his treatise on divination, introduces his brother Quintus as remarking on the existence among the Gaunds of augurs or soothsayers, known by the name of Druids. With one of these, Divitius, an Æduae, Quintus says he was well acquainted. Cicero's contemporary, Diodorus Siculus, informs us that there were among the ancient Gauls bards, certain philosophers and theologians named Druids, and soothsayers. He also hints at some connection between their philosophy and that of Pythagoras. The geographers, Strabo and Pomponius Mela, add little to our knowledge of the Druids. Lucan, in his Pharsalia, mentions, among the Gallic and other tribes that relapsed into their former ways, the Presbyter Caesar's crossing the Rubicon, "the worshippers with bloody rites of Teutates, Hesus, and Tanarus," and refers immediately afterwards to the bards and Druids. Something more noteworthy is told by the elder Pliny. According to him the Gallic Druids held the mystic tree in the highest veneration. Groves of oak were their chosen retreats. Whatever grew on that tree was thought to be a gift from heaven, more especially the mistletoe. When thus found the latter was cut with a golden knife by a priest clad in a white robe, two white bulls being sacrificed on the spot. The name given by the Druids signified in their language All-Hail, and its virtues were believed to be very great. Two other herbs, called selago and samolus, were likewise greatly valued by them for their medicinal efficacy. But the most remarkable of all the Druidical charms was the angumeum, or snake's egg. It was said to be produced from the saliva and frothy sweat of a number of serpents writhing in an entangled mass, and to be tossed up into the air as soon as formed. The fortunate Druid who managed, as it fell, to catch it, encased it in gold, rode off at full speed on a horse that had been in waiting for him, pursued by the serpents till they were stopped by the intervention of a running stream. A genuine specimen of this egg when thrown into the water would float against the current, even if tossed in gold. Pliny declares that he had seen one. "It is," he says, "about the size of a moderately large round apple, and has a cartilaginous rind studded with cavities like those on the arms of a polypus." Tacitus, in describing the attack made on the island of Mona (Anglesea) by the Romans under Suetonius Paulinus, represents the legionsaries as being awe-struck on landing by the appearance of a band of Druids who, with hands uplifted towards heaven, poured forth terrible imprecations on the heads of the invaders. The courage of the Romans, however, soon overcame such fears; the Britons were put to flight; and the groves of Mona, the scene of so many a sacrifice and bloody rite, were cut down. The annalists Lampridius and Vopiscus, two of the Scriptorum Historiae Augustae, introduce us, if the "Dryas" of these writers be connected, as is probable, with the "Druids" with other Druids, as other Druids, who, however, are simply prophetic women. For example, Vopiscus tells us, on the authority of his grandfather, who
had the story from the future emperor himself, that it had been foretold to Diocletian by one of these women that he would wear the purple after he had slain a wild boar. Many years afterwards, when Diocletian found himself on the death of Numerian, unexpectedly declared emperor by the troops, he at once cut down with his sword Arrius Aper, regarding whom dark suspicions were afloat, explaining, “At length I have slain the fatted wild boar,” and thus fulfilled the prophecy delivered to him in Gaul by the wise woman. Anonimus of Bordeaux, tutor of Gratian, son of the Emperor Valentinian, in his Professores, or notices of the professors of his native city, apostrophizes the rhetorician Attius Patera as sprung from a race of Druids and from the priesthood of Belenus, and as deriving his name of Patera from being connected through the latter with the mysteries of Apollo. He also addresses another as keeper of the temple of Belenus, and as the offspring of the Druids. Lastly, Ammianus Marcellinus, after noticing the foundation of Marseille by a colony of Phocæans, goes on to state that when the people in those parts had been gradually civilized, learned sibyls, which had been begotten by the bards, the Enahges (probably a corruption of the Odários, i.e., Vates, of Strabo), and the Druids, throve vigorously. Of these, he says the Druids were intellectually superior to the others, and were formed into unions in accordance with the precepts of Pythagoras.

The early Christian fathers seem most to mention the Druids. Origen, Clement of Alexandria, and others speak of them as philosophers or priests among the Gauls, but in a manner that shows they knew almost nothing about them. In early Irish poems and tales, however, a class of persons called by this name is frequently referred to, who also appear as Magi in certain well-known lives of Irish saints written in Latin. These Irish Druids were a kind of sorcerers. They were said to be in league with the demons of paganism, and to be able by this agency to do good to their friends and mischief to their enemies. The followers of this first maintenance of Christianity in Ireland and Scotland seem to have thought it necessary, in order to prove the superiority of the new faith, to spread the belief that its apostles also were gifted with supernatural powers, which they could use more especially for the purpose of counteracting the malice of these Druids. Thus Adamnan, in his life of Columba, reproduces that saint as miraculously baffling the machinations of Broichan, the Druid of the Fintiah kung Brude, when they met at the court of the latter near the mouth of the Ness.

To John Toland probably belongs the credit of being the first to plan, for he did little more, a connected history of the Druids, in which the scanty notices of ancient writers were to be expanded and largely supplemented by details drawn from other sources. This he did in three letters addressed to Viscount Molesworth, and first published from the author's papers in 1726, some years after his death. A little later, Pelloutier, in his Histoire des Celtes, carried out a portion of Toland's design by giving a lengthened account of the origin, position, and influence of Druidism among the early Celtic tribes. On the foundations thus laid others were not slow to build. It is from Cæsar and Pliny, of course, that the materials have been chiefly derived. But fragments of very doubtful value were eagerly appropriated from every quarter; and in this way an imposing structure was reared, the solidity of which till very recently few ever thought of doubting. If we may trust these writers, the ancient priesthood of Brittain and Gaul, in pomp of ritual not less than in learning and influence, rivalled the hierarchies of later days. Clad in white and wearing ornaments of gold, they celebrated their mystic rites in the depths of the forest. The House mentioned by Lucan was said, on the authority of a remark by Lactantius, to be their chief deity. But they had other gods, especially Apollo, whom they worshipped under the name of Belenus, supposed to be the Phœnixan Baal. They believed in metempsychosis, or the doctrine of the transmigration of souls. That their philosophy was identical with that of Pythagoras was held as certain, though whether Pythagoras was the instructor of the Druids or the Druids of Pythagoras, or whether indeed both did not derive these tenets from a common source, were most questions. Pythagoras' friend Abares, the mysterious Hyperborean philosopher who rode on an arrow, the gift of Apollo, must have been a British Druid. Botany, astronomy, medicine, and latters were all subjects studied by the Druids; though, in spite of their boasted erudition, many of their rites were barbarous in the extreme. In mechanics they had attained to no mean skill, since the ponderous megalithic remains of Britain and France could have been set up only by them. Stone circles like Stennis and Cailarnish were ancient temples, once surrounding groves sacred to Druidism. According to Strabo and Sticheni, the cathedral of the arch­druid of all Britain, and Aventicum with its avenues had been originally constructed in the form of a circle with a serpent attached to it—the circle being regarded as the symbol of the Supreme Being, and the serpent of the divine Son. Dolmens or cromlechs were transformed into altars, and even the mênhir or stone pillar, and the rock­ing-stone, were pressed into the service of the druidic priesthood. In the neighbourhood of the circles, as well as on the tops of mountains, may be seen cairns sur­mounted each by a flat stone, on which Druid fires were lighted. Over their countrymen the authority of the Druids was almost unbounded, continuing to assert itself long after the order had passed away. With Druidism every unexplained custom and almost every relic of Celtic antiquity were held to be connected, and the superstitions that still linger in the ancient homes of the Celtic race were set down as derived from the same source. Its decadence is attributed by these writers to the hostility of the Romans. Ardent lovers of their country as well as of liberty, the Druids, it is asserted, were the uncompromising foes of Roman rule in the west. Hence sprang the orders issued for their suppression by Claudius, to which reference is made both by Pliny and Strabo. In the end, Rome proved too strong for Druidism, and the political power of its priesthood was soon broken, especially in Gaul and South Britain. Some, among whom Herodotus is prominent, maintain that, after the destruction of pagan Druidism as a system, the order was revived as a corrupt form of Christianity, in which the truths of the latter were largely mixed up with the rites of Mithras, the sun god of the Persians. This hypothesis, to which its supporters have given the name of neo-Druidism, has already been noticed in the article Celtic Literature (vol. v. p. 318).

These views were for a long time generally received in this country as well as on the Continent. In France, Druidism has proved an attractive subject to some writers of a high order of ability, who have discussed it, if not from a more critical, at least from a more philosophical, standpoint. Amédée Thierry, in his Histoire des Gaulois, while adopting in the main the opinions of Toland, Pelloutier, and their followers, finds in the accounts that have come down to us traces of two distinct systems of religion in ancient Gaul. One of these was a worship of natural phenomena and objects, akin to the polytheism of the Greeks; the other a kind of metaphysical pantheism, strikingly resembling the religions of some Eastern nations. The latter, according to him, was the foundation of Druidism, and had been brought into the country when the Cynic branch of the Gauls entered it under a leader named Huitou, or Hesus,
defied after his death. The more ancient inhabitants, also a Gaulish race, were the polytheists, whose religious belief, however, the Cynni did not altogether destroy but rather amalgamated with their own. Thirry further thinks that Druidism was on the decline in Gaul before the days of Caesar. At a time the Gallic nobles on the one hand, and the people on the other, became alike jealous of a priestly authority that controlled both and had succeeded in greatly reducing their political influence. For a while the Druids retained their power as a religious and learned order, and preserved many of their privileges, but even at the date of Caesar's invasion there had so diminished that Britain, and not Gaul, was recognized as their chief seat; but the most distinguished among the expounders of Druidism is undoubtedly Jean Reynaud, one of the chief of a small school of thinkers whose metaphysical speculations have exercised in France a real, if an indirect and quiet, influence. Reynaud, who was of a mystical cast of mind, began in 1836, along with Pierre Leroux, the publication of L'Encyclopédie Nouvelle, which, however, was never finished. For this the former wrote the article "Druidisme," which he afterwards enlarged and gave to the world separately under the title of L'Esprit de la Gaule, dedicated to his friend, the historian Henri Martin. It is an elaborate and in some respects able essay. Reynaud maintains that the ancient Druids were the first to teach clearly the doctrine of the soul's immortality and that they had originally as high conceptions of the true nature of God as the Jews themselves. If they afterwards encouraged the worship of subordinate deities, it was for the purpose of reconciling to Druidism that class of uneducated minds for which the cultus of demons and angels has more attraction than the worship of the Unseen One. Hence, radically the same word as the Aria of the Greeks, was the type of an absolute supreme Being whose symbol on earth was the oak, and was quite distinct from His, the leader of the Cynonic Gauls. The misletoe, when found growing on the latter, represented man, a creature entirely dependent on God for support, and yet with an individual existence of his own. Human sacrifices were a natural consequence of the idea, dominant now as in the days of the Druids, that the higher the victim the more complete the atonement offered to the Deity for the sins of man. Druidism declined and at last disappeared, because, according to Reynaud, one element was wanting in its system both of morals and of religion, necessary to the true development of man or society—clarity or love. The Druids aimed indeed at the improvement of both, but failed to prescribe the true means of promoting it. Christianity supplied what was needed, and Druidism disappeared—not, however, till it had accomplished what was its special mission, the preservation in Western Europe of the idea of the unity of God. How far all this is mere theory founded on insufficient data, or an attempt, more or less successful, to prove the existence among the Gallic tribes of certain ideas regarding the true nature of God and his relation to man, which afterwards degenerated into the grossest superstition, it would be out of place to discuss here. Reynaud's views have been to a great extent accepted by Henri Martin, one of the foremost of French historical writers; and both countenance the neo-Druidical fancies of Davies and Herbert. In Germany the latest authority on Druidism seems to be Barth—Ueber die Druiden der Kelten—"Over the Druids of the Celts"—which closely the views long popular in this country. To judge from the article "Druiden" in the last edition (1875) of Meyer's Conversations Lexicon, nothing fresher has yet found currency there.


DRU, a musical instrument of percussion, which is supposed to have been introduced into Europe from the East by the Moors or after the Crusades. In certain forms, however, it was known in Europe in classical times. The Greek and Roman symposium seems from descriptions and iconographical representations to have included not only tambourines but kettledrums of a small size, or at least instruments convex on one side like the kettle-drum. The instrument designated in Scripture a timbrel (Heb topk) was undoubtedly a kind of tambourine, such as might be conveniently played by females. In India and Egypt the use of drums in a considerable variety of forms may be traced back to the earliest historic times. The tam-tam or tomtom of India, a cylindrical drum of some size beaten with the fingers, had its counterpart in Egypt at least as early as 1600 b.c. Among savage races, whose music has not risen above the primitive or percussive stage, the drum is naturally the chief, and in many cases the sole instrument employed. Three principal forms of drum are in general use in the modern orchestra,—the common or side drum, the base or Turkish drum, and the kettledrum. The first is composed of a cylinder of wood, or, more generally, of metal, covered at each end with vellum or parchment, the tension of which is regulated by strings. As its name indicates, it is worn at the side of the performer, who beats upon the upper side with two sticks. Its distinctive though not its exclusive use is to accompany the military file band. The base drum is a larger instrument of the same kind, the cylinder being composed of oak. It is beaten at both ends with drum-sticks furnished with leather pads. It is an important constituent of the full military band, and is also employed in the orchestra, especially by more modern composers. The kettledrum is the most important form of the instrument in orchestral as distinct from military music. It is composed of a bass of brass or copper, almost hemispherical in shape, covered with vellum attached to an iron ring, and is usually placed upon an iron tripod. By means of screws it is capable of being tuned within certain necessarily narrow limits. Kettledrums are always used in pairs, one being tuned to the key-note and the other to the fourth below. The music is usually written in the key of C, and the key in which it is to be played, if different, is indicated in words at the beginning of the passage. The three forms of drum just described are essential in every complete orchestra. In addition other percussive instruments, such as the gong and the tambourine, are sometimes introduced for the sake of particular effects.

DRUMMOND, HENRY (1786-1860), an English banker, politician, and miscellaneous writer, remarkable for the versatility of his gifts and the eccentricity of his character, was born on the 9th December 1786. He was the eldest son of Henry Drummond, a prominent London banker, and a daughter of the first Lord Melville. He was educated at Harrow and at Christ Church, Oxford. His name is per-
Drummond, William (1855–1849), of Hawthorden, a Scottish poet of the Scottish school, and descendant of an old family of noble blood, was born at Hawthorden, near Edinburgh, on the 13th December 1855. His father, John Drummond, was the first laird of Hawthorden; and his mother, Susannah Fowler, was well-connected, her brother William being private secretary to Queen Anne, and a man of literary tastes. Drummond received his early education at the Edinburgh High School, and graduated as M.A. of the recently founded (1832) metropolitian university in July 1605. The years 1607 and 1608 were spent at Bourges and Paris in the study of law; and, in 1609, Drummond was again in Scotland, where, by the death of his father in the following year, he became laird of Hawthorden at the early age of twenty-four. The list of books he read up to this time indicates a strong preference for the finer and more imaginative, as distinguished from the argumentative kinds of literature. Accordingly, on finding himself his own master, Drummond naturally abandoned law for the muse; "for," says his biographer in 1711, "the delicacy of his wit always run on the pleasantness and usefulness of history, and on the fame and softness of poetry." He was a good linguist, and read Latin, Greek, Italian, Spanish, French, and Hebrew. He had already written several poems, chiefly sonnets; and some early letters, which have been preserved, show a fine command of pure English, as well as Drummond's critical sagacity in abandoning the Scottish dialect for the language raised to literary supremacy by the illustrious Elizabethans. Drummond's first publication appeared in 1615, and was an elegy on the death of Henry, prince of Wales, called Years on the Death of Malcolm.

As might have been expected from Spenser's influence, it is pastoral throughout. Milton, in his Lycidas, has at once initiated and surpassed this early poem of Drummond's. In 1614 Drummond for the first time met Sir William Alexander, known later as earl of Stirling, the author of a tremendous poem on Doom's day. In the following year Drummond sustained a dreadful blow in the death of Miss Cunningham of Barns, to whom he was engaged to be married. In 1616, the year of Shakespeare's death, appeared Poems: Amorous, Funeral, Divine, Pastoral: in Sonnets, Songs, Satyrs, Madrigals, being substantially the poetry of his love and loss. Drummond's next poem is entitled Perish Festivity: A Panegyric to the King's Most Excellent Majesty, and celebrates James's visit to Scotland in 1617. In 1618 there was an interesting correspondence between Drummond and Drayton; and, about the close of the same year, or about the beginning of 1619, Drummond was honoured with a visit of a fortnight or more from the great literary dictator of the time—Ben Jonson. Drummond, as tradition relates, sat awaiting Jonson's arrival under the shade of a fine sycamore, and exclaimed when Jonson came in sight, "Welcome, welcome, royal Ben!" Upon which the dramatist rejoined, "Thank ye, thank ye, Hawthorden." The famous account of their conversations, long supposed to be lost, was discovered in the Advocate's Library, Edinburgh, by Mr David Laing, and, after being read to the Society of Scottish Antiquaries in 1832, appeared, ten years later, as a publication of the Shakespeare Society. The conversations are full of interesting items, some going to the origin of his poem, whom he frankly told that he "was too good and simple, and that oft a man's modesty made a fool of his wit."
The next few years in Drummond's life are comparatively uneventful, being marked only by correspondence with Sir William Alexander and Drayton. In 1623, the year of a great famine and consequent mortality in Scotland, appeared the poet's fourth publication, entitled *Flowers of Scotia* by William Drummond of Hawthornedene to which adjoined his *Cypresse Groove*. From 1625 till 1630 Drummond was probably for the most part engaged in traveling on the Continent. In 1637, however, he seems to have been home for a short time, as, in that year, he appears in the entirely new character of the holder of a patent for the construction of military machines, entitled "Litora Magistra Gulielmi Drummond de Fabrica Machinarum Militariam, Anno 1627." The same year, 1627, is the date of Drummond's magnificent gift of about 500 volumes to the library of Edinburgh University. This collection, to which Drummond afterwards made additions, is kept in a separate cabinet, and is particularly rich in the English poets. In 1630 Drummond again began to reside permanently at Hawthordene, and, in 1631, he received his last letter from Drayton, who died in London on the 23rd of December. In 1633 Drummond married Elizabeth Logan, by whom he had five sons and four daughters. In 1633 Charles made his coronation visit to Scotland; and Drummond's pen was employed in writing congratulatory speeches and poetry. As Drummond naturally preferred Episcopacy to Presbyterianism, we are not surprised to learn that he approved of the main object Charles had in view in this visit, although his peace-loving nature was averse to the means employed in establishing Episcopacy. Drummond was a true Scottish gentleman in his pride of blood. Partly to please the earl of Perth, partly to satisfy his own curiosity, the poet had studied the genealogy of the family very carefully, and had given due prominence to the fact that Annabella Drummond, daughter of Sir John Drummond of Stobbhall, was the queen of Robert III. This investigation was the real secret of Drummond's interest in Scottish history, and so we find that he now began his *History of the Lives and Reigns of the Five Jameses, Kings of Scotland*—a work which did not appear till 1655, and is remarkable only for its good literary style. His next work was called forth by the king's enforced submission to the oppression of his Scottish subjects. It is entitled *Irene, or a Remonstrance for Concord, Anity, and Love amongst His Majesty's Subjects*, and embodies Drummond's political creed of submission to authority as the only logical refuge from democracy, which he hated. In 1639 Drummond had also to sign the Covenant in self-protection, but was uneasy under the burden, as existing squabbles by him testify. Drummond's next work *Nanayaia: or a Defence of a Petition tendered to the Lords of the Council of Scotland by certain Noblemen and Gentlemen, January, 1643*, is a political pamphlet in support of those royalists in Scotland who wished to espouse the king's cause against the English Parliament. Its burden is a passionate invective on the intolerance of the then dominant Presbyterian clergy; but Irene fails to do justice to the substantial work they had done. Drummond's subsequent works were chiefly royalist pamphlets, written with more or less caution, as the times required.

After being an invalid for several months the poet died on the 4th December 1649, and was buried in the churchyard of Lasswade, a neighbouring village.

The only works of Drummond which call for special notice are the *Cypresse Groove* and the poems. The *Cypresse Groove*, one of the noblest prose poems in literature, exhibits great wealth of illustration, much fine thinking, and an extraordinary command of musical English. It is an essay on the folly of the fear of death, and shows how much the author was impressed with the comparative insufficiency of this world. *This globe of the earth,* says he, "which seemeth huge to us, in respect of the universe, and compared with that wide pavilion of heaven, is less than little, of no sensible quantity, and but as a point" (1711 edition, p 123). Death, he argues, from many of its accidental associations, appears to be more dreadful than it really is. Its unversality, and a correct estimate of human life, ought to nerve us against the fear of death. Further we should remember that death is not annihilation, but the vestibule to immortality and a higher life. The essay, which is composed throughout in a strain of lofty idealism, is entitled in the form of a vision.

A noteworthy feature in Drummond's poetry is that it manifests no characteristic Scottish element, but owes its birth and inspiration rather to the English and Italian masters. This was owing partly to his anti-Presbyterian bias and his long residence abroad, but it was also natural, on other grounds, for a quiet, cultured, and meditative poet to imitate the Elizabethans and the great Italian writers. Drummond was essentially a follower of Spenser, delighting in the description of outer nature, and, amid all his sensuousness, and even in those lines most conspicuously Luten with lustrous beauty, there is a dash of melancholy thoughtfulness—a tendency deepened by the death of his first love. Drummond was so successful as a writer of sonnets that he was called "the Scottish Petrarch," and his sonnets are still ranked immediately after Shakespeare's, Milton's, and Wordsworth's. Most of his poems are steeped in the pro-Copernican ideas of astronomy, and are marked by a sense of the smallness of the visible in comparison with the infinite lying beyond. Thus is one of Drummond's favourite moods, and he is constantly harping upon such phrases as "the All," "this great All." Even in such of his poems as may be called more distinctively Christian, this philosophic conception is at work. Drummond's poems are distinguished by pensive beauty, sweetness of versification, and richly worded descriptions, but lack vigour and originality. Altogether this poet is to be remembered as the best representative of "sweetness and light" amid much that was dull and ephemeral in contemporary Scottish literature.

There are several editions of his works. (1) Hall's edition of the prose works, published in 1625. (2) Philips's edition of the poems, published in 1640. (3) A new edition of his poems, issued by Lord Dundurness and David Irving, issued in 1832. (4) The complete edition of Drummond's poems and sonnets, published in 1655. The only collected edition of the prose writings was published in 1711. Drummond's life has been ably written by Professor Macon (1873) (T. G.).

DRUNKENNESS may be either an act or a habit, the latter consisting in frequent repetitions of the former. As an act it may be an accident, most usually arising from the incautious use of one or other of the commonly employed intoxicating agents, as a habit it is one of the most degrading forms of vice which can result from the enfeeblement of the moral principle by persistent self-indulgence. Drunkenness is a mere complexity of symptoms which may arise from many different causes. To be drunk is simply to be sopheptic, and the close resemblance between the pathological and the toxic phenomena has been the cause of many untoward accidents. Cold alone may produce such peculiar effects that Captain Perry has said, in his *Journal*, "I cannot help thinking that many a man may have been punished for intoxication who was only suffering from the benumbing effects of frost; for I have more than once seen our people in a state so exactly resembling that of the most stupid intoxication, that I should certainly have charged them with the same offence had I not been quite sure that no poisonous fluids were afforded them on Melville Island to procure anything stronger than snow water."
But, apart from the pathological causes of seeming drunkenness, this condition may be actually produced by a multitude of agents whose use is so wide-spread throughout the world as inevitably to lead to the belief that their moderate employment must deserve some important object in the economy of nature. Moreover, the physiological action of all these agents gradually shades into each other, all producing or being capable of producing consecutive paralysis of the various parts of the nervous system, but only in doses of a certain amount, which vary with the agent, the race, and the individual. Even the cup so often said to “cheer, but not inebriate,” cannot be regarded as altogether free from the last-named effect. Teas-sets are well known to be affected with palpitation and irregularity of the heart, as well as with more or less sleeplessness, mental irritability, and muscular tremors, which in some culminate in paralysis; while positive intoxication has been known to be the result of the excessive use of strong tea (Third Annual Report of the Massachusetts Board of Health, p. 129). In short, from tea to haschisch we have, through hops, alcohol, tobacco, and opium, a graded scale of intoxicants, which, in moderate use of the same agent has-particularly of late, prolonged his stage is by no means always or readily produced. It is a stage is by no means always or readily produced. It is

The effects of intoxicants are variously modified by the temperament of the individual and the nature of the inebriant. When that is alcohol, its action on an average individual is first to fill him with a serene and perfect self-complacency. His feelings and faculties are exalted into a state of great activity and buoyancy, so that his language becomes enthusiastic, and his conversation vivacious. But of the two great influences which regulate the prevalence of intemperance, that of race far exceeds that of temperature. A glance at the map of the world, coupled with some knowledge of its history, teaches us that, whether in temperate, subtropical, or tropical regions, wherever the Teuton is, there drunkenness prevails; and the wild orgies in which Tacitus tells us the Teuton of his day indulged in the cold climate of northern Europe are reproduced with wonderful circumstantiality irrespective of climate or temperature. It may be, as a recent speaker has said, that “a national love for strong drink is a characteristic of the nobler and more energetic populations of the world;” it may be, as he goes on to say, that it “accompanies public and private enterprise, constancy of purpose, liberality of thought, and aptitude for war;” it, as he further adds, “exhibits itself prominently in strong and nervous constitutions, and assumes in very many instances the character of a curative of itself.” In other words, in certain constitutions the moderate use of stimulants excites to action rather than to a sensual key, and the pleasurable stimulus of action becomes the reward of human effort. Even the most timid individuals less likely to fall into degrading habits of excess.

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The poison primarily affects the cerebral lobes, and the other parts of the cerebro-spinal system are consecutively involved, till in the state of dead drunkenness, the parts not invaded by a benumbing paralysis are those automatic centres in the medulla oblongata, which regulate and maintain the circulation and respiration. But even these centres are not unaf f ected; the paralysis of these as of the other sections of the cerebro-spinal system varies in its incompleteness, and at times becomes complete, the coma of drunkenness terminating in death. More usually the intoxicant is gradually eliminated, and the individual restored to consciousness, a consciousness disturbed by the secondary results of the agent he has abused, and which vary with the nature of that agent. Whether, however, directly or indirectly, through the nervous system the stomach suffers in every case; thus nutrition is interfered with by the defective ingestion of food, as well as by the mal-assimilation of that which is ingested; and from this cause, as well as by the peculiar local action of the various poisons, we have the various organic degenerations induced which in most cases shorten the drunkard's days.

The primary discomforts of an act of drunkenness are readily removed for the time by a repetition of the cause. Thus what has been an act may readily become a habit, all the more readily that each repetition more and more enfolds both the will and the judgment, till they become utterly unfit to resist the temptation to indulgence supplied by the knowledge of the temporary relief to suffering which is sure to follow, and in spite of the consciousness that each repetition of the act only forges their chains more tightly. From this condition there is no hope of relief but in enforced abstinence; any one in this condition must be regarded as temporarily insane, and ought to be placed in an inebriate asylum till he regain sufficient self-control to enable him to overcome his love for drink. The desire for stimulants is one of the strongest instincts of human nature. It cannot be annihilated, but may be regulated by reason, conscience, education, or by law when it encroaches on the rights of others or is injurious to the individual himself. By the Intoxicating Liquors Licensing Act of 1872 any one found drunk on a highway or public place or in a licensed house is liable to a fine of 10s., on a repetition of the offence within twelve months to one of 20s., and on a third offence within twelve months to one of 40s. To be drunk or riotous, or to be drunk while in charge of a horse, a carriage, or a gun is punishable with a fine of 20s. or imprisonment for one month. And by the Police and Improvement Act of 1884, 25 Vict. c. 101, § 264, six persons found drunk on the streets are subject to a fine of 40s. or 14 days' imprisonment, wherever that Act has been adopted. These Acts, properly enforced, ought to restrain the public exhibitions of drunkenness; while for those seasonal feasts who ruin their own health and debauch their families, without perhaps ever appearing in public oppressively drunk, the only remedy which appears to promise hope of reform would seem to be the power of temporarily confining them to an inebriate asylum. (n. w. s.)

DRUSES, a people of Syria remarkable for the pertinacity and success with which they have defended their independence against the encroachments of Turkish supremacy, and for the profession of a form of religious belief, which, in the words of Dean Milman, is "one of the most extraordinary aberrations which ever extensively affected the mind of man." The greater part of the people, and the great convenience we shall distinguish as the Western Druses, occupy the mountainous region of Lebanon and Anti-Lebanon; but there are also extensive settlements in the Haurn or Auranitis; a considerable colony exists at Safed, in Palestine proper, to the north-west of the Sea of Tiberias; and it is believed that a number of Crypto-Druses—Druses, however, by religion only, and not by race—still maintain themselves in the neighbourhood of Cairo. The Western Druses are found as far north as Beyrount, as far south as Sur or Tyre, and as far east as Damascus; in the north they are intermingled with Maronites, and in the south with Greeks and Melchites. They form the exclusive population of about 120 towns and villages, and share with the Christians the occupation of nearly 230 more, their total number, not reckoning women and children, has been calculated at from 60,000 to 65,000 men. The chief town of the district which they occupy, though not their most populous settlement, is Deur-el-Kamar—the Convent of the Moon—situated about 15 miles south-east of Beyrount, in the district of Mansaaf, it was the seat of the powerful family of the Abu Nekads, and in its vicinity is the palace of Efsteddin, formerly occupied by the emir Beuchr Shebaa, Ammatam and Bakhlin in the Lebanon, and Hasheya and Rosheya in the Anti-Lebanon, rank as sacred cities, and serve as rallying-points in time of war.

The Eastern or Hauranite Druses are less known, and preserve their ancient customs and characteristics perhaps more perfectly than their western brethren. The date at which they first settled in the district is not ascertained, but for many generations the Hauran has been the chosen refuge of rebels and malcontents from the west, and has consequently increased its population at the expense of the Lebanon. The same process of emigration is still going on, and the Turkish Government has to be careful not to press too heavily on the defaulting Druse of the west, lest it needlessly augment the power of the more independent community. The number in the Hauran was stated by Cyril Graham at 7000 men in 1857, at present it must be much nearer 10,000. The principal town is Kunawat, the residence of the most influential of the Ockals.

In many respects the Druses are a mysterious people, and, in spite of the great additions made to our knowledge in the present century, many important questions in regard to them still await solution. Of their origin and ethnographical affinity no absolutely certain information has been obtained. Though they speak Arabic with a correctness that would do credit to the people of Mecca, and their feudal aristocracy refer to their Arab descent with feelings of pride, it is pretty generally agreed that, whatever may be true of certain families, the main body of the people does not belong to the Semitic family. Mr Cyril Graham regards them as of Indo-Teutonic race, and describes them as "fair-haired, of light complexion, strong and active, and often as tall as northern Europeans." Their own tradition vaguely connects them with China, where they firmly believe that to this day there exist numerous adherents of their creed, and whence they expect the advent of their promised deliverer. The mere fact that they possess a knowledge of the Celestial Empire in such contrast to the geographical ignorance of the other Syrian races is in itself remarkable enough; though it would be rash to assert that it is practically significant. According to an opinion mentioned by Sandys, and pretty often to be met with in the older accounts, they derive their name from a count of Duria, and are mainly the descendants of a band of the crusaders who were left behind, and finally forgot their country and language and creed, but this story is disproved by the fact that allusion is made to their existence at an earlier date than that of Sandys's mention, and the number of their present name, which is properly Durus, dates no further back than about the 11th century, and throws
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no light on the question of affinity; and just as little is to be learned from the various explanations current among ourselves—those put in possession (of the faith), from the Arabic verb darasa, those who read the book of Hamze, as if from darasa, the clever ones, from Durs; the shehids, from Turs, and so on. It is well known, however, that the district which they now occupy has over an age, received extraneous additions to its population; and, in the absence of more precise information, it seems at least certain that, whatever may have been the original nucleus of his race, the Druse of the present day carries the mingled blood of a various ancestry, in like manner as his religion combines the products of many different intellectual moments. The presence of a Kurdish element is un doubted, and its influence may probably be traced in the peculiar position granted to the women.  

The rise and progress of the religion which gives unity to the race can be stated with considerable precision. As a system of thought it may be traced in some of its leading principles to the Shiite sect of the Batenians, or Batmiya, whose main doctrine was that "every outer has its inner, and every passage in the Koran an allegorical sense," and to the Karamatians, or Karmiita, who pushed this method to its furthest limits; as a creed it is, somewhat more recently, in the year 386 A.H. (996 A.D.) Hakim Bimarushli (i.e., he who judges by the command of God), the sixth of the Fatimitc caliphs, began to reign; and during the next twenty-five years he indulged in a tyranny at once so terrible and so fantastic that little doubt can be entertained of his insanity. As madmen in general do, he believed that he held direct intercourse with the deity, or even that he was an incarnation of the divine intelligence; and in 407 A.H., or 1016 A.D., his claims were made known in the mosque at Cairo, and supported by the testimony of Ismael Darazi. The people showed such bitter hostility to the new gospel that Darazi was forced to seek safety in flight; but even in absence he was faithful to his god, and succeeded in winning over the ignarant inhabitants of Lebanon. According to Druse authority this great conversion took place in the year 410 A.H. Meanwhile the endeavours of the caliph to get his divinity acknowledged by the people of Cairo continued. The advocacy of Hasan ben Hadara Fargani was without effect; but in 405 A.H. the new religion found a more successful apostle in the person of Hamze ben Ali ben Ahmed, a Persian mystic, fatemaker by trade, who became Hakim's vizier, gave form and substance to his creed, and by his ingenious adaptation of its various dogmas to the prejudices of existing sects finally substituted an extensive body of adherents. In 411 the caliph was assassinated by contrivance of his sister Sitt Almulk; but it was given out by Hamze that he had only withdrawn for a season, and his followers were encouraged to look forward with confidence to his triumphant return. Darazi, who had acted independently in his apostolate, was branded by Hamze as a heretic, and thus, by a curious anomaly, he who expressed the greatest devotion to the mysteries—in contradistinction from whom all other members of the Druse community, whatever may be their position or attainments, are called Djehel' or Ignorant. About 15 per cent. of the adult population belong to this order. Admission is granted to any Druse of either sex who expresses willingness to conform to the laws of the society, and during a year of probation gives sufficient proof of sincerity and stability of purpose. There appears to be no formal distinction of rank among the various members; and though the emir Beshir Sheshab used to appoint a shahik of the Ockals, this person thus designated obtained no further authority. His influence depends on exceptional sanctity or ability. All are required to abstain from tobacco and wine; the women are

1 Cf. Lord Carnarvon's suggestive account of the Yezidis.
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to wear neither gold nor silver, nor silk, nor brocade, and although neither celibacy nor retirement from the affairs of the world is either imperative or customary, unusual respect is shown to those who voluntarily submit themselves to ascetic discipline. While the Ockals mingle frankly with the common people, and are remarkably free from what in Europe would be called clerical pretension, they are none the less careful to maintain their privileges. They are distinguished by the wearing of a white turban, emblematic of the purity of their life. Their food must be purchased with money lawfully acquired, and lest they should unwittingly partake of any that is ceremonially unclean, they require those dajahs whose hospitality they share to supply their wants from a store set apart for their exclusive use. The ideal Ockal is grave, calm, and dignified, with an infinite capacity of keeping a secret, and a devotion that knows no limits to the interests of his creed. On Thursday evening, the commencement of the weekly day of rest, the long been persuaded that the Druses

of course styled the calf by

ance is the mother of suspicion as well as of either statement. The calf, if calf there be, is probably a symbol of the exorable heroys of Darazi, who is frequently styled the calf by his orthodox opponents. Ignorance is the mother of suspicion as well as of devotion, and accordingly the Christian inhabitants of the Lebanon have long been persuaded that the Druses in their secret assemblies are guilty of the most nefarious practices. Of this allegation, so frequently repeated by European writers, there seems to be little evidence, and it is certain that the sacred books of the religion inculcate what is on the whole a high-toned morality. Colonel Churchill, in his last volume, asserts that while the majority of the people follow the pure teaching of Boháeddn, there still exists a party which indulges in the "dark and unscrupulous libertinism of Darazi."

The Druses, like the Arabs, have a high reputation for hospitality, and they give special welcome to the English, whom they regard as their particular friends and allies. Whoever presents himself at their door in the quality of a suppliant or passenger is sure of being entertained with food and lodging in the most generous manner. Volney often saw the lowest peasants give their last morsel of bread to the hungry traveller; and their only answer to the accusation of impiety was, "God is great and liberal, and all men are brethren." Bogyary at the same time is altogether unknown among the common people, and the Ockals are not a mendacious order. It would be easy to illustrate by many a striking incident the fidelity with which they keep the pledge to give to the guest who has eaten of their bread and salt. Nor is their hospitality unassociated with other virtues. "There was nothing," says Lord Carnarvon, "which surprised me more than the self-possession, the delicate appreciation of washes and feel-

ings, the social ease, and to a great extent the refinement which distinguished the conversation and manners of some of the Druse chiefs whom I then met, and on which no drawing-room of London or Paris could have conferred an additional polish, and a similar testimony is borne by Mr. Chassaud, who was brought up in the city of Beyrouth, and had abundant opportunities of observation. There is a darker side, indeed, to the picture, though, after all, while his merits are in the main peculiarly his own, the Druse only gives additional intensity to the ruthlessness and revengefulness of so many of the Eastern nations.

Polygamy is not permitted. Among the old feudal families intermarriage is often restricted to one or two houses, and the daughter of a sheik will rather remain a virgin than bring disgrace on her blood by a misalliance. The marriage of near relations is naturally the consequence, but, whatever may have been formerly the case, it no longer appears to be the custom for brother and sister to wed. All prenuptial arrangements on the part of the woman are conducted by the father, who cannot act, however, without her consent. On the wedding day a number of Ockals and a few of the bridegroom's relations go to the bride's house; the marriage contract is drawn up and read, and the bride, completely enveloped in a veil, is led off on horseback to her husband, accompanied by her friends, both male and female. As she approaches her future home, the bridegroom's party alludes forth, and a mock contest, with blank cartridge, ensues. Ultimately the bride is successful; shouts of welcome follow her into the harem, where she is received and cared for by the women of her husband's family. After a little she is left alone, the bridegroom enters, lifts her veil, takes his first glance at his wife, replaces it, and withdraws. The revels continue for several days. Divorce is freely allowed; but when once obtained it cannot be cancelled, though either party is free to marry again. Births are rarely celebrated with any public or private jubilation. When a sheik dies, all the sheiks in the mountain are at once informed. Next day they assemble, and the dead body is borne forth in an open coffin to meet all those whom it is especially wished to honour. All day long the mourners walk up and down the median, or tilt-yard, in parties of fifty and sixty, singing and reciting eulogy or dirge. At midnight the corpse rushes into the "ichroom" and kills the dead man's hands and face and beard. A little before sunset the burial takes place. The women watch afar off, while the men follow silently to the grave. A few passages from the Korâan are read by the Ockals, and then the remains are laid in the mausoleum, or the mausoleums are built without doorways, and the wall has to be broken down to admit each new tenant. Those who die in the odour of sanctity are buried in their own houses: the tomb is in the form of an altar, and stands east and west, and the body is laid on its side with the face looking to the south.

Education, according to Eastern ideas, receives considerable attention among the Druses; and all their ladies, in contrast to the majority of their countrywomen, can both read and write. The defence and the diffusion of their religion were originally undertaken in great measure by means of little books or treatises; and from an early period several of the wealthiest sheiks have prided themselves on their collection of manuscripts. For a people so small in number, their literature, though almost purely theological, is remarkably extensive—a fact which may probably be ascribed to the influence of the Semitic element. In spite of the excessive care with which their manuscripts have been guarded (and they are enjoined if need be to kill any alien found in possession of their sacred books), a considerable number have perished, and are now only known by fragments.
number, undoubtedly genuine, have found their way to Europe. A copy of the Book of the Testimonies to the Mohammadans, consisting of seventy treatises, in four folio volumes, was found in the house of the chief Ockal at Bahkh, and presented in 1700 to Louis XIV. by Nusrali Ibn Gida, a Syrian doctor. Other manuscripts are to be found at Rome in the Vatican, at Oxford in the Bodleian, at Vienna, at Leyden at Upsala, and at Munich, and the text got possession of the seven standard works of Druce theology while at Damascus. The Munich collection was presented to the king of Bavaria by Clothey, the chief physician in the Egyptian army during its occupation of Syria; and for a number of the other manuscripts, the history of the Druce nationality by the emir Haider Shehab is quoted by Urquhart.

From an early period, the internal organization of the Druces has been constructed after a patriarcho-feudal type, which, as usual, has placed some amount of patrilineal power in the hands of the chiefs or sheiks, and given rise to an endless succession of petty feuds and confederations between the various clans or families. Into the picturesque souvenirs of the resulting history, composed and recollected by Turkish encroachments and intrigues, it would be useless to enter; and the current of the reader may easily be grated by turning to Colonels Churchill's invaluable, in scanes of diffuse and desultory volumes. The following, however, may be mentioned as among the most important of the clans, which at one period or another have acquired an individual position in the Lebanon region. The Tseckis or Tsechis, now extinct, who had their seat at Abveh or Obveh, in the Shabab, a short distance to the S. of the Baalbek; the Tallisack family, originally the two branches of the Kassem, one branch of which has its principal residence at Hettat, and the other at Allehy, about nine and ten miles respectively S.E. of Beyrout; the Abudalisaks with their seat at Khdada, about four miles S. of Hettat; the Casus of Busur, nearly two miles to S. of Hettat, an offshoot of the Tseckis; the house of Rasian with its seat at Shweirat, seven miles S. of Beyrout; Amunidah, now settled at Abveh, remarkable for their attention to religion; the house of Jumilil in Dsmbelbat with its splendid mansion at Mubar; the eastern branch of the Lebanon the Cufes, or Aleleh-Awalik, the Alue-Nekada, formerly the feudal lords of Deul-el-Kamar; the house of Abu-Hammar, a family of the elder Nishabur. A history of the Druce nationality by the emir Haider Shehab is quoted by Urquhart.

In January 1842 the Turkish Government appointed Omer Pasha, as administrator of the Druces and Maronites, with a council of four chiefs from each party; the position of the latter was that of the Ottoman emir in the S. of the Lebanon, with full powers, to assist the chief of the other party, to hold office for three years. The decision fell on Daud Pasha, a Catholic Armenian, who was installed in 4th of July. In spite of many difficulties, and especially the obstinate conduct of the Turks, he succeeded in restoring order; and by the formation of a military force from the inhabitants of the Lebanon he rendered unnecessary the presence of the Turkish soldiery. He was reappointed for five years at the close of his first term; and his administration seems to have been a permanent pacification.
church, he studied Greek and Latin at Ghent, and philosophy at Louvain; but his father having been outlawed for his religion, and deprived of his estate, retired to England, where the son followed him in 1567. He found an admirable teacher of Hebrew in Chevalier, the celebrated Orientalist, with whom he resided for some time at Cambridge. In 1572 he became professor of Oriental languages at Oxford. Upon the pacification of Ghent (1576) he returned with his father to their own country, and was appointed professor of Oriental languages at Leyden in the following year. In 1585 he removed to Freeland, and was admitted professor of Hebrew in the university of Franeker, an office which he discharged with great honour till his death, which happened in February 1616. He acquired so extended a reputation as a professor, that his classes were frequented by students from all the Protestant countries of Europe. His works prove him to have been well skilled in Hebrew and in Jewish antiquities; and in 1600 the States-General employed him, at a salary of 400 florins a year, to write notes on the most difficult passages in the Old Testament; but, as he was frequently interrupted in prosecuting this undertaking, was not published until after his death. As the friend of Arminius, he was charged by the orthodox and dominant party with unfairness in the execution of this task, and the last sixteen years of his life were, therefore, somewhat embittered by controversy. He carried on an extensive correspondence with the learned in different countries; for, besides letters in Hebrew, Greek, and other languages, there were found amongst his papers upwards of 2000 written in Latin. He had a son, John, who died in England at the age of twenty-one, and was accounted a prodigy of learning. He had mastered Hebrew at the age of nine, and Scaliger said that he was a better Hebrew scholar than his father. He wrote a large number of letters in Hebrew, besides notes on the Proverbs of Solomon and other works. Fagius states the number of the printed works and treatises of the elder Drusus at forty-eight, and of the unprinted at upwards of twenty. Of the former more than two-thirds were inserted in the collection entitled Otium Sacrum, see Anotatia Doctissimorum Virorum in Vetus et Novum Testamentum (Amsterdam, 1698, in 9 vols. folio, or London, 1699, in 10 vols. folio). Amongst the works of Drusus not to be found in this collection may be mentioned: Alphabetum Hebraicum rotat. (1534, 4to); 2 Tabulae in Grammaticam Chaldæam ad usum Juventutis, (1602, 8vo), S An edition of Ephraem Syrus, (Prague, 1607, 12mo), 4. Opuscula grammaticalia: Grammaticæ medii aevi, (1609, 4to), 5. Lecturae in obitum J. Scaligri, (1609, 4to), and 6. Grammatica Lingua Syriane (1615, 4to).}

DRUSUS, Marcus Livius, a patrician of the age of the Gracchi, and a colleague of Caius Gracchus in the tribuneship, 123 B.C. He was a creature of the senatorial party, and was employed by them to offset the measures of the popular tribune. Gracchus had proposed to found three colonies outside Italy; Drusus provided twelve in Italy. Gracchus had proposed to distribute allotments to the poorer citizens subject to a state rent-charge; Drusus promised them free of all charge. Gracchus had proposed to give the Latiuns the citizenship; Drusus added immunity from corporal punishment, even in the field. The bill thus censured was swallowed; the people fomented their champion, who fell an easy victim to the hired braves of Opimius. Drusus was rewarded for his services by the consularship, which he held, 112 B.C. He received Macedonia for his province, where he distinguished himself in a campaign against the Scordisci, where he drove across the Danube into Dacia, being the first Roman general who reached that river. It is probable that he is the Drusus mentioned by Plutarch as having died in the year of his censorship, 109 B.C.

DRUSUS, Marcus Livius, son of the preceding, and, like his father, during the first part of his career a thorough supporter of the optimates. From his earliest youth he devoted himself to politics, was assiduous as a pleader in the law-courts, and lavished in gifts and shows the large fortune which he inherited. By such popular acts he rose to be tribune of the people, 91 B.C. In the agitation which was then raging for the transfer of the judicial functions from the equites to the senate, he proposed a measure which restored to the senate their office of judges, while the numbers were doubled by the admission of 300 equites. But the senate was lukewarm, and the knights whose occupation was threatened offered the most violent opposition. In order, therefore, to catch the popular votes, he coupled with this measure others for the establishment of colonies in Italy and Sicily, and the distribution of corn at a reduced rate. By help of these riders the bill was carried, but not till its most factious opponent, the consul Philippus, had been arrested by Drusus and carried off to prison. To strengthen his hands Drusus now sought a closer alliance with the Italians, promising them the long coveted boon of the Roman franchise. The senate, who had before suspected his aims, broke out into open opposition. His laws were abrogated as informal, and each party armed its adherents for the civil struggle which was now inevitable. It was only prevented, or rather postponed, by the assassination of Drusus. One evening as he was returning to his house he was struck by a dagger, and fell at the foot of his father's bust, exclaiming with his dying breath, "When will the republic find again a citizen like me!" His character is hard to decipher, and is one of the most problems of Roman history. To some he has appeared an unscrupulous adventurer, who deserted his own order to gratify his selfish ambition; others have pronounced him the ablest and wisest of the Roman demagogues. That he was proud and ambitious there can be no question. When a quaestor in Asia he refuses to wear the robes of office, "ne quid ipso esse insignius." When summoned before the senate he holds them come to him—"they will find me in the Cuma Hostilia—and they came. No less certain is it that the reforms he advocated were, on the whole, salutary and needful. The corruption of the equites was flagrant, the claims of the Italians to the franchises were just and pressing. Drusus was the Minerva of the social revolution of Rome, and had his measures been carried Rome might have been spared the most terrible of her civil wars.

DRYADES, or Hamadryades, in Greek Mythology, were nympha of trees and woods, each particular tree or wood being the habitation of its own special Dryad, just as each river was the abode of its own local god. From being so closely identified with trees, the Dryades came to be thought of as having been, like the trees, produced from the earth, as Hesiod says, Theog., 129.

DRYANDER, Jonas (1748-1810), a Swedish naturalist of eminence, and a pupil of Linnaeus, was born in 1748. By his uncle, Dr Lars Montius, to whom his education was entrusted, he was sent to the university of Gottingen, whence he removed to Lund. After taking his degree there in 1776, he studied at Upsala, and then became for a time tutor to a young Swedish nobleman. He next visited England, and, on the death of his friend Dr Solander in 1782, he succeeded him as librarian to Sir Joseph Banks. He was librarian to the Royal Society and also to the Linnean Society. Of the latter, in 1768, he was one of the first founders, and, when it was incorporated by royal charter in 1802, he was chiefly concerned in the drawing up of its laws and regulations. He was vice-president of the society till the time of his death, which took place in October 1810. Besides papers in the Transactions of the Linnean and other societies, Dryander published Dissertationum Philosophicorum, Ser. Praeh. (Upsala, 1774); and Observations Historico-Naturalia, 8 vols. (Stockholm, 1774-1805). He also edited the first and part of the second edition of Linnaeus's Nova Organographia, and Roxburgh's Plants of the Coast of Commodore.
DRYDEN, John (1631-1700), the poet, born on the 9th of August 1631, at Aldwinkle, in Northamptonshire, was of Cumberland stock, though his family had been settled for three generations in Northamptonshire, had acquired estates and a baronetcy, and intermarried with landed families in that county. His great-grandfather, who first carried the name south, and acquired by marriage the estate of Cunnas Ashby, is said to have been so proud of the great scholar's friendship that he gave the name of Erasmus to his eldest son. The name Erasmus was borne by the poet's father, the third son of Sir Erasmus Dryden. The connections and connections of the family were Puritan and anti-monarchical. Sir Erasmus Dryden went to prison rather than pay loan money to Charles I; the poet's uncle, Sir John Dryden, and his father Erasmus, served on Government commissions during the Commonwealth. His mother's family, the Pickeringes, were still more prominent on the Puritan side. Sir Gilbert Pickering, his cousin, was chamberlain to the Protector, and was made a peer in 1669.

Dryden's education was such as became a scion of these respectable families of squires and rectors, among whom the chance contact with Erasmus had left a certain tradition of scholarship. His father, whose only fortune, added to his wife's, the daughter of the rector of Aldwinkle All Saints, was not large, and whose family, of whom the poet was the eldest, amounted to fourteen, procured him admission to Westminster School as a king's scholar, under the famous Dr Busby. Some elegiac verses which Dryden wrote there on the death of a young Lord Hastings, in 1649, had the distinction of being published in a volume called Laetysm Mournam, among other elegies by "divers persons of nobility and worth" in commemoration of the same event. He appeared soon after again in print, among writers of commendatory verses to King's scholar, under the famous Dryden's next appearance was in the making a "John Dryden of Trinity Coll," having gone up from Westminster to Cambridge in May 1650. He was elected a scholar of Trinity on the Westminster foundation in October of the same year, and took his degree of B.A. in 1654. The only record of incident of his college residence is some unexplained contumacy to the vice-chancellor, for which he was "put out of commons" and "gated" for a fortnight. No inference can be built upon this as to Dryden's habit at the university. Contumacy to authorities was not a feature in his later life. His father died in 1654, leaving him master of two-thirds of a small estate near Blakeley, worth about £60 a year. The next three years he is said to have spent at Cambridge. It was then probably that he laid the foundation of that habit of learned discussion of literary methods which is so remarkable a feature in the prefaces to his plays and poems. Not content with doing a thing, like writers who are suddenly placed under the necessity of writing, Dryden must always be arguing as to how it ought to be done, pushing on argumentative justification in advance of execution. Whether or not he spent the three years before 1657 at Cambridge, there can be little doubt, judging from internal evidence, that he spent them somewhere in study; for his first considerable poem bears indisputable marks of scholarly habits, as well as of a command of verse that could not have been acquired without practice.

The middle of 1657 is given as the date of his leaving the university to take up his residence in London. In one of his many subsequent literary quarrels, it was said by Shadwell that he had been clerk to Sir Gilbert Pickering, his cousin, the favourite of Cromwell; and nothing could be more likely than that he obtained some employment under his powerful cousin when he came to London. He first emerged from obscurity with his Heroic Stanzas to the memory of the Protector, who died September 1658. That these stanzas should have made him a name as a poet does not appear surprising when we compare them with Waller's verses on the same occasion. Dryden took some time to consider them, and it was impossible that they should not give an impression of his intellectual strength. The name was not new; it was obvious that he must or must not; and his imagination were saturated with Donne's elegiac strains when he wrote; yet when we look beneath the surface, we find unmistakable traces that the pupil was not without decided tendencies that ran counter to the practice of the master. It is plainly not by accident that each stanza contains one clear-cut brilliant point. The poem is an academic exercise, and it seems to be animated by an undercurrent of strong continuous protest against the irregularities tolerated by the authorities. Dryden had studied the ancient classics for himself, and their method of uniformity and elaborate finish commended itself to his robust and orderly mind. In itself the poem is a magnificent tribute to the memory of Cromwell. Now that the glittering style of the so-called "metaphysical poets" has gone very far out of fashion, it requires an effort, a deliberate dismissal of prejudices, to enjoy such a poem. A poet writing now on such a subject as this would present his grandeur in a much more direct and simple way. Yet judged in the spirit of its own style, Dryden's is a noble poem. The recognition of Cromwell's greatness is full and ample. The thought in each stanza, the inclosing design of each of the parts of the edifice, is massive and imposing, although the massiveness is not presented in its naked simplicity, so as to hold the foremost place in the eye—the gaze being arrested by glittering accidents, so that the essential grandeur of the mass is disguised and diminished. We are not invited to dwell upon the grand outline; we are not called upon to surrender ourselves to its simple impressiveness; but it is there, although the author does not insist upon it, and rather deprecates it, waves it off, and challenges our admiration of some artificial centre of attraction. It is the ornamental centre upon which the art of the poet has laboured, not the effect of the massive whole; still there is loftiness and nobility in the scope of the work, if our prejudices in favour of a less admired workmanship permit us to feel it.

From a moral point of view, Dryden's next appearance as a poet is not creditable. To those who regard the poet as a seer with a sacred mission, and refuse the name altogether to a literary manufacturer to order, it comes with a certain shock to find Dryden, the hereditary Puritan, the panegyrst of Cromwell, hailing the return of King Charles in Astraea Redux, deploring his long absence, and proclaiming the despair with which he had seen "the rebel thrive, the loyal crew." From a literary point of view also, Astraea Redux is very inferior to the Heroic Stanzas; Dryden had need of Waller's clever excuse that it is easier to praise a bad man than a good, because the essence of poetry is fiction. And it was not merely in thus hastening to welcome the coming guest, and recant all praise of his rival, that Dryden showed a shamelessly accommodating spirit, and placed himself in such an unpleasant contrast to the greater poet who was waiting his fate in all but friendless blindness. It might have been expected of one with his Puritan connections and scholarly training that, if he purposed making a living by the stage, which was restored with Charles, his literary as well as his moral conscience would have reminded him to make some effort to raise it at least not to lower its tone. But Dryden seems to have had no higher ambition than to make some money by his pen. He naturally first thought of tragedy,—his own genius, as he has informed us, inclining him rather to
that species of composition, and in the first year of the Restoration he wrote a tragedy on the fate of the duke of Guise. But some friends advised him that its construction was not suited to the requirements of the stage, so he put it aside, and used only one scene of the original play later on, when he again attempted the subject with a more practised hand. Having failed to write a suitable tragedy, he next turned his attention to comedy, although, as he admitted, he had little natural turn for it. He was very frank afterwards in explaining his reasons for writing comedy. "I confess," he said, in a short essay in his own defence, printed before The Indian Emperor, "my chief endeavours are to delight the age in which I live. If the humour of this be for low comedy, small accidents, and raiillery, I will force my genius to obey it, though with more reputation I could write in verse. I know I am not so fitted by nature to write comedy; I want that gaiety of humour which is required to it. My conversation is slow and dull, my humour saturnine and reserved, in short, I am none of those who endeavour to break pots in company or make repartees. So that those who decry my comedies do me no injury, except it be in point of profit. reputation in them is the last thing to which I shall pretend." This of course, was said by Dryden standing at bay; there was some bravado, but also a great deal of frank truth in it. He was really as unadapted a playwright as the age demanded comedies, and he endeavoured to supply the kind of comedy that the age demanded. His first attempt was unsuccessful. Bawdy, intricate, and coarsely humorous dialogue seemed to him to be part of the popular demand, and, looking about for something to suit him in a Spanish source, and wrote The Wild Gallant. The play was acted in February 1663, by Killigrew's company in Vere Street. It was not a success, although the most farcical incident received a certain interest and probability from a story which was current at the time. That a student, fresh from his library, trying to hit the taste of the groundlings with ribald farce, should make the ingredients too strong even for their palates, was not natural. Pepys showed good judgment in pronouncing the play "so poor a thing as ever I saw in my life." That such a play should be written by Dryden, and acted in by one of the daughters of Stephen Marshall, must have been a bitter thought for Puritans at the time. Dryden never learned moderation in his humour; there is a student's clumsiness and extravagance in his indecency; the plays of Etherege, a man of the world, have not the uncouth notoriety of Dryden's. Of this he seems to have been conscious, for when the play was revived, in 1667, he complained in the epilogue of the difficulty of comic wit, and admitted the right of a common audience to judge of the wit's success. Dryden, indeed, took a lesson from the failure of The Wild Gallant; his next comedy, The Rival Ladies, also founded on a Spanish plot, produced before the end of 1663, was correctly described by Pepys as "a very innocent and most pretty witty play," though there was much in it which the taste of the time would consider indecent. But he never quite conquered his tendency to extravagance. The Wild Gallant was not the only victim. The Assumption, or Love in a Nursery, produced in 1673, shared the same fate; and even as late as 1680, when he had had twenty years' experience to gain, his The Keepsake, or the Kind Keeper, was prohibited, after three representations, as being too indecent for the stage. Dislike to indecency we are apt to think a somewhat ludicrous pretex to be made by Restoration playwrights, and probably there were some other real reasons of composition of Limerick; all there is is a certain savagery in the spirit of Dryden's indecency which we do not find in his most licentious contemporaries. The undissembled force of the man earned him to an excess from which more dexterous writers held back.

After the production of The Rival Ladies in 1663, Dryden assisted Sir Robert Howard in the composition of a tragedy in heroic verse, The Indian Queen, produced with great splendour in January 1664. It was probably through this collaboration that Dryden made the acquaintance of Lady Elizabeth Howard, Sir Robert's sister, whom he married on the 1st of December 1663. Lady Elizabeth's reputation was somewhat compromised before this union, and, though she brought some small addition to the poet's income, she does not seem to have added to his happiness. The Indian Queen was a great success, one of the greatest since the reopening of the theatres. This was in all likelihood due much less to the heroic verse and the exclusion of comic scenes from the tragedy than to the magnificent scenic accessories—the battles and sacrifices on the stage, the aerial demons singing in the air, and the god of dreams ascending through a trap. The novelty of these Indian spectacles, as well as of the Indian characters, with the splendid Queen Zempha, acted by Mrs Marshall in a real Indian dress of feathers presented to her by Mrs Aphra Behn, as the centre of the play, was the chief secret of the success of The Indian Queen. These melodramatic properties were so marked a novelty that they could not fail to draw the town. The heroic verse formed but a small ingredient in the play, still, being also a novelty which had just been introduced by Davenant in The Siege of Rhodes, it interested the scholarly part of the audience, and helped to consolidate the success of the stage. Dryden was tempted to try the same tragedy a second time, the follow up The Indian Queen with The Indian Emperor, which was acted in 1665, and also proved a success.

But Dryden was not content with writing tragedies in heroic verse. Taking it up with enthusiasm as the only thing which the Elizabethan dramatists had left for their successors to excel in, he propounded the propriety of rhyme in serious plays as a thesis for discussion, and made it the prominent question of the day among men of letters. He took up the question immediately after the success of The Indian Queen, in the preface to an edition of The Rival Ladies. In that first statement of his case, he considered the chief objection to the use of rhyme, and urged his chief argument in its favour. Rhyme was not natural, some people had said; to which he answers that it is as natural as blank verse, and that much of its unnaturalness is not in the fault of the rhyme but of the writer, who had not sufficient command of language to rhyme easily. In favour of rhyme he has to say that it at once stimulates the imagination, and prevents it from being too discursive in its flights. During the Great Plague, when the theatres were closed, and Dryden was living in the country at the house of his father-in-law, the earl of Berkshire, he occupied a considerable part of his time in thinking over the principles of dramatic composition, and threw his meditations on the subject of rhyme into the form of a dialogue, which he called an Essay of Dramatic Poetry, and published in 1668. One of the main topics of the essay was the admissibility of rhyme in serious plays. Dryden making Neander, the interlocutor, who represents himself, repeat with fresh illustrations all that he had said in its favour. By this time, however, Sir R. Howard, his brother-in-law, whom he had joined in writing the rhymed Indian Queen, had changed his mind about the heroic couplet, and made some offensive comments on Dryden's essay in a hasty-toisy preface to The Duke of Lerma. Dryden at once replied to his brother-in-law in a master-piece of sarcastic retort and vigorous reasoning, publishing his reply as a preface to The Indian Emperor. It is the ablest and most complete statement of his views about the employment of rhymed couplets in tragedy.
Before his return to town at the end of 1666, when the theatres were reopened, Dryden wrote a poem on the Dutch war and the Queen's death. The poem is in quatrains, the metre of his Heroic Stanzas in praise of Cromwell, which Dryden chose, he tells us, "because he had ever judged it more noble and of greater dignity both for the sound and number than any other verse in use amongst us." The preface to the poem contains an interesting discussion of what he calls "wit-writing," introduced by the remark that "the composition of all poems is or ought to be of wit." His description of the Fire is a famous specimen of this wit-writing, much more careless and daring, and much more difficult to sympathize with, than the graver conceits in his panegyric of the Protector. In Annea Mirabilis the poet apostrophizes the newly founded Royal Society, of which he had been elected a member in 1662, more probably through personal connection than on the ground of scientific attainments.

From the reopening of the theatres in 1666, till November 1668, the date of his Absalom and Achitophel, Dryden produced nothing but plays. The stage was his chief source of income. Secret Love, or the Maiden Queen, a tragi-comedy, produced in March 1667, does not come up to our expectations as the first-fruit of the author's rest from composition and prolonged study of dramatic art. The prologue claims that it is written with pains and thought, by the exactest rules, with strict observance of the unities, and "a mingled chime of Jonson's humour and of Corneille's rhyme;" but it owed its success chiefly to the charm of Nell Gwynne's acting in the part of Florimel. It is noticeable that only the more passionate parts of the dialogue are rhymed, Dryden's theory apparently being that rhyme is then demanded for the elevation of the style. His next play, Sir Martin Marall, an adaptation from Molière's L'Estronde, was produced at the Duke's Theatre, in the name of the duke of Newcastle. It was about this time that Dryden became a retained writer under contract for the King's Theatre, receiving from it £300 or £400 a year, till it was burnt down in 1672, and about £200 for six years more till the beginning of 1678. If Sir Martin Marall was written but not produced before this contract was entered into, one can understand why it was announced as the duke of Newcastle's. His co-operation with Davenant in a new version of Shakespeare's Tempest—for his share in making Dryden can hardly be pardoned on the ground that the chief alterations were happy thoughts of Davenant's, seeing that he affirms he never worked at anything with more delight—must also be supposed to be anterior to the completion of his contract with the Theatre Royal. The existence of the contract came to light from Dryden's non-fulfilment of its terms. He was engaged to write three plays a year, and he contributed only ten plays during the ten years of his engagement, finally exhausting the patience of his partners by joining in the composition of a play for the rival house. In adapting L'Estronde, Dryden did not catch Molière's lightness of touch; his alterations go towards making the comedy into a farce. Perhaps all the more on this account Sir Martin Marall had a great run at the theatre in Lincoln's Inn Fields. As we have said, there is always a certain coarseness in Dryden's humour, apart from the coarseness of his age,—a certain forcible roughness of touch which belongs to the character of the man. His An Evening's Love, or the Mock Astrologer, an adaptation from the younger Corneille, produced at the King's Theatre in 1668, seemed to Pepys "very smutty, and nothing so good as The Maiden Queen or The Indian Emperor of Dryden making." Evelyn thought it foolish and profane, and was gruved "to see how the stage was degenerated and polluted by the licentious times." Ladies à la Mode, another of Dryden's contract comedies, produced in 1668, was "so mean a thing," Pepys says, that it was only once acted, and Dryden never published it. Of his other plays, in the course of 1670—The Nunnery (1672), Limberham, or the Kind Keeper, only the first was moderately successful. The failure was not due to want of ribaldry.

While Dryden met with such indifferent success in his willing efforts to supply the demand of the age for low comedy, he struck upon a really popular and profitable vein in heroic tragedy. Tyrannic Love, or the Royal Martyr, a Roman play, in which St Catherine is introduced, and with her some striking supernatural machinery, was produced in 1669. It is in rhymed couplets, but the author again did not trust solely for success to them; for, besides the magic incantations, the singing angels, and the view of Paradise, he made Nell Gwynne, who had stabbed herself as Valeria, start to life again as she was being carried off the stage, and speak a notionally funny epilogue, in violent contrast to the serious character of the play. Almiznor and Almahide, or the Conquest of Granada, a tragedy in two parts, appeared in 1670. It seems to have given the crowning touch of provocation to the wits, who had never ceased to ridicule the popular taste for these extravagant heroic plays. Dryden almost invited burlesque in his epilogue to The Conquest of Granada, in which he charged the dust of the Elizabethan age with coarseness and mechanical humour, and its conceptions of love and honour with meanness, and claimed for his own time and his own plays an advance in these respects. The Rehearsal, written by the duke of Buckingham, with the assistance, it was said, of Clifforld, Sprat, and others, and produced in 1671, was a severe and just punishment for this boast. Dryden is here unmercifully ridiculed under the name of Bayes, he having obtained the laureateship from the king (with a pension of £300 a year and a butt of Canary wine) in 1670. It is said that The Rehearsal was begun in 1663 and ready for representation before the Plague. But this probably only means that Buckingham and his friends were so tickled with the absurdities of Davenant's operatic hero in The Siege of Rhodes, and the extravagant heros of The Indian Queen, that they resolved to burlesque them. Materials accumulated upon them as the fashion continued, and by the time Dryden had produced his Tyrannic Love, and his Conquest of Granada, he had so established himself as the chief offender as to naturally become the centre of the burlesque. It is commonly said that Dryden passed over the attack on himself without reply, either because he admitted its justice or because he feared to offend the king's favourite. But this is not strictly so; his reply is contained in the dedication and preface to his Conquest of Granada; and his prose defence of the epilogue was published in 1672, in which, so far from laughing with his censors, he addresses them from the eminence of success, saying that "with the common good fortune of prosperous gamesters he can be content to sit quietly." Heroic verse, he assures them, is so established that few tragedies are likely henceforward to be written in any other metre, and he retorts upon their exposure of improbabilities in his plays, by criticizing the ridiculous incoherent stories and mean writing of Shakespeare and Jonson. Dignified reassertion of his positions was Dryden's way of meeting the ridicule of The Rehearsal. In the course of a year or two, The Conquest of Granada being attacked also by Settle, a rival playwright who had obtained considerable success, he had an opportunity of taking revenge in a style more suited to his sharp temper and power of severe writing.

Dryden's reply to The Rehearsal was lofty and firm. But though he put a bold face on a practice which it is but fair to suppose that he adopted only to supply a popular
demand, he did not write many more heroic plays in rhyme. Perhaps the ridicule of The Rehearsal had destroyed their popularity. His next tragedy, Ambrosia, an exhibition of certain atrocities committed by the Dutch on English merchants in the East Indies, put on the stage to inflame the public mind in view of the Dutch war, was written, with the exception of a few passages, in prose, and those passages in blank verse. An opera which he wrote in rhymed couplets, called The State of Innocence, or the Fall of Man, an attempt to turn part of Paradise Lost into rhyme, as a proof of its superiority to blank verse, was produced by an apology for heroic poetry and poetic licence, and published in 1674, but it was never acted. The redeeming circumstance about the performance is the adulation professed by the adapter for his original, which he pronounces "undoubtedly one of the greatest, most noble, and most sublime poems which either this age or nation has produced." Dryden is said to have had the elder poet's leave "to tag his verses." Aurengzebe was Dryden's last rhymed tragedy. In the prelude he confessed that he had grown weary of his long-loved mistress rhyme. But the stings of The Rehearsal had stimulated him to do his utmost to justify his devotion to her mistress. He claims that Aurengzebe is "the most correct" of his plays, and it is certainly superior, both in versification and in moderation of language, to its predecessors. It was acted in 1678, and published in the following year.

If Dryden had died in 1676, at the age of forty-five, he would have left a very inconsiderable name behind him. The fray between him and Settle might have been looked upon as a passage at arms between equals. After the production of Aurengzebe he seems to have rested for an interval from writing, enabled to do so, probably, by an additional pension of £100 granted to him by the king. During this interval he would seem to have reconsidered the principles of dramatic composition, and to have made a particular study of the works of Shakespeare. The fruits of this appeared in All for Love, or the World Well Lost, a version of the story of Antony and Cleopatra, produced in 1678, which must be regarded as a new departure in his dramatic career, a very remarkable departure for a man of his age, and a wonderful proof of undiminished openness and plasticity of mind. In his previous writings on dramatic theory, Dryden, while admiring the rhyme of the French dramatists as an advance in art, did not give the same praise to the regularity of their plots; he was disposed to give the preference to the irregular structure of the English dramatists, as being more favourable to variety both of action and of character. But now he abandoned rhyme, and, if we might judge from All for Love, and the precepts laid down in his grounds of criticism in tragedy, the chief point in which he aimed at excelling the Elizabethans was in giving greater unity to his plot. He upheld still the superiority of Shakespeare to the French dramatists in the delineation of character, but he thought that the scope of the action might be restricted, and the parts bound more closely together with advantage. All for Love and Antony and Cleopatra are two excellent plays for the comparison of the two methods. Dryden gave all his strength to All for Love, writing the play for himself, as he said, and not for the public. Carrying out the idea expressed in the title, he represents the two lovers as being more entirely under the spell of love than Shakespeare's Antony and Cleopatra. Shakespeare's Antony is moved by other impulses than the passion for Cleopatra; it is his master motive, but it has to maintain a struggle for supremacy; "Roman thoughts" strike in upon him even in the very height of the passion of his mistress, he cannot bear the yoke, and breaks away from her of his own impulse at the call of spontaneously reawakened ambition. Dryden's Antony is so deeply sunk in love that no other impulse has power to stir him; it takes much persuasion and skilful artifice to detach him from Cleopatra even in thought, and his soul returns to her violently before the rupture has been completed. On the other hand, Dryden's Cleopatra is so completely enmeshed by love for Antony that she is incapable of using the calculated caprices and meretricious coquettices which Shakespeare's Cleopatra deliberately practises as the highest art of love, the surest way of maintaining her empire over her great captain's heart. It is with difficulty that Dryden's Cleopatra will agree, on the earnest solicitation of a wily counsellor, to begin a hiring for Dolabella to excite Antony's jealousy, and she cannot keep up the pretence through a few sentences. The characters of the two lovers are thus very much contracted, indeed almost overwhelmed, beneath the pressure of the one ruling motive. And as Dryden thus introduces a greater regularity of character into the drama, so he also very much contracts the action, in order to give probability to this temporary subjugation of individual character. The action of Dryden's play takes place wholly in Alexandria, within the compass of a few days; it does not, like Shakespeare's, extend over several years, and present incessant changes of scene Dryden chooses, as it were, a fragment of an historical action, a single moment during which motives play within a narrow circle, the culminating point in the relations between his two persons. Antony devotes his whole play, also, to those relations; only what bears upon them is admitted. In Shakespeare's play we get a certain historical perspective, in which the love of Antony and Cleopatra appears in its true proportions beneath the firmament that overhangs human affairs. In Dryden's play this love is our universe, all the other concerns of the world retire into a shadowy, indistinct background. If we rise from a comparison of the plays with an impression that the Elizabethan drama is a higher type of drama, taking Dryden's own definition of the word as "a just and lively image of human nature," we rise also with an impression of Dryden's power such as we get from nothing else that he had written since his Heroic Stanzas, twenty years before.

It was twelve years before Dryden produced another tragedy worthy of the powers shown in All for Love. Don Sebastian was acted and published in 1690. In the interval, to sum up briefly Dryden's work as a dramatist, he wrote Oedipus (1678) and The Duke of Guise (1683) in conjunction with Lee, Troilus and Cressida, 1679; The Spanish Fruits, 1681; Elizabethan Drama, 1685; Amphitryon, 1690. In Troilus and Cressida he follows Shakespeare closely in the plot, but the dialogue is rewritten throughout, and not for the better. The versification and the language of the first and the third acts of Oedipus, which with the general plan of the play were Dryden's contribution to the joint work, bear marked evidence of his recent study of Shakespeare. The plot of Don Sebastian is more intricate than that of All for Love. It has also more of the characteristics of his heroic dramas; the extravagance of sentiment and the suddenness of impulse remind us occasionally of The Indian Emperor; but the characters are much more elaborately studied than in Dryden's earlier plays, and the verse is snappy and powerful. It would be difficult to say whether Don Sebastian or All for Love is his best play; they share the palm between them. Dryden's subsequent plays are not remarkable. Their titles and dates are—King Arthur, an opera, 1691; Cleomenes, 1692, Love Triumphs, 1694.

Soon after Dryden's abandonment of heroic couplés in tragedy, he found new and more congenial work for his favourite instrument in satire. As usual the idea was not original to Dryden, though he struck in with his majestic step and energy divine, and immediately took the lead.
His pioneer was Mulgrave's *Essay on Satire*, an attack on Rochester and the court, circulated in 1679. Dryden himself was suspected of the authorship, and engaged by hired ruffians as the author; but it is not likely that he attacked the king on whom he was dependent for the greater part of his income. In the same year Oldham's satire on the Jesuits had immense popularity, chiefly owing to the excitement about the Popish plot, and its extension towards the close of 1681, on the side of the court, at the moment when Shaftesbury, baffled in his efforts to exclude the duke of York from the throne as a papist, and secure the succession of the duke of Monmouth, was wasting his trial for high treason. *Absalom and Achitophel* produced a great stir. Nine editions were sold in rapid succession in the course of a year. It was a new thing for the public to have the leading men of the day held up to laughter, contempt, and indignation under disguises which a little trouble enabled them to penetrate. There was no compunction in Dryden's ridicule and invective. Delicate wit was not one of Dryden's gifts; the motions of his weapon were sweeping, and the blows hard and trenchant. The advantage he had gained by his recent studies of character was fully used in his portraits of Shaftesbury and Buckingham, Achitophel and Zimri. In these portraits he shows considerable art in the introduction of redeeming traits to the general outline of malignity and depravity. Against Buckingham Dryden had old scores to pay off, but he was too practised in the language of eulogy and invective to need any personal stimulus. "Glorious John" had a mind superior to petty hatreds, as well as, it must be admitted, to petty friendships, and it is not impossible that the fact that his pension had not been paid since the beginning of 1680 weighed with him in writing this satire to gain the favour of the court. In a play produced in 1681, *The Spanish Friar*, he had written on the other side, gratifying the popular feeling by attacking the Papists. Three other satires, viz. which he followed up *Absalom and Achitophel*, dealt with smaller game than this master-piece, though one of them was hardly inferior in point of literary merit, *The Medal*; written in ridicule of the medal struck to commemorate Shaftesbury's acquittal. Then Dryden had to take vengeance on the literary champions of the Whig party, who had opened upon him all their artillery. Their leader, Shadwell, he essayed to demolish under the nickname of "MacFlecknoe." Besides a separate poem under that title, he contributed a long passage to a second part of *Aubelom and Achitophel*, written chiefly by Nahum Tate, in which Ferguson, Forbes, Settle, and Shadwell were victims of his stinging lash. *Religio Laceri*, which came immediately after, in November 1682, though nominally an exposition of a layman's creed, and deservedly was admired as such, was not without a political purpose. It attacked the Papists, but declared the "fanatics" to be still more dangerous, which fitted in with Charles's policy of conciliating the church by persecuting the Non-conformists.

Dryden's next poem in heroic couplets was in a different strain. On the accession of James, in 1685, he became a Roman Catholic. There has been much discussion as to whether this conversion was or was not sincere. It can only be said that the coincidence between his change of faith and his change of patron was suspicious, and that Dryden's character for consistency is certainly not of a kind to quench suspicion. The force of the coincidence cannot be removed by such pleas as that his wife had been a Roman Catholic for several years, or that he was converted by his son, who was educated at Cambridge, even if there were any evidence for these statements. Scott denied Dryden's conversion, as Macaulay denounced it, from party motives; on any other grounds, it is not worth discussing. Nothing can be clearer than that Dryden all his life through regarded his literary powers as a means of subsistence, and had little scruple about accepting a brief on any side. *The Hind and Panther*, published in 1687, is an ingenious argument for Roman Catholicism, put into the mouth of "a milk-white hind, immortal and unchanged." There is considerable beauty in the picture of this tender creature, and its enemies in the forest are not spared. One can understand the admiration that the poem received when such allegories were in fashion. It was the chief cause of the veneration with which Dryden was regarded by Pope, who, himself educated in the Roman Catholic faith, was taken as a boy of twelve to see the veteran poet in his chair of honour and authority at Will's coffee-house. It was also very open to ridicule, and was treated in this spirit by Prior and Montagu, the future earl of Halifax. Dryden's other literary services to James were a savage reply to Stillingfleet—who had attacked two papers published by the king immediately after his accession, one said to have been written by his late brother, in advocacy of the Church of Rome, the other by his late wife explaining the reasons for her conversion—and a translation of a life of Xavier in prose. He had written also a panegyric of Charles, and a eulogy of James under the title of *Britannia Rediviva*, which it is interesting to compare with his other productions of the same kind. Dryden did not abjure his new faith on the Revolution, and so lost his office and pension as laureate and historiographer royal. For this act of constancy he deserves credit, if the new powers would have considered his services worth having after his frequent apostasies. His rival Shadwell reigned in his stead. Dryden was once more thrown mainly upon his pen for support. He turned again to the stage and wrote the plays which we have enumerated. A great feature in the last decade of his life was his translations from the classics. A volume of miscellanies published in 1688 had contained some translations from Virgil, Horace, Lucretius, and Theocritus. He now produced translations more deliberately as a saleable commodity. A volume of miscellanies, which appeared in 1693, contained translations from Homer and Ovid. In the same year he published a translation of the satires of Juvenal and Persius, written with the assistance of his two elder sons. Johnson passes on this work the just criticism that "though, like all other productions of Dryden, it may have shining parts, it seems to have been written merely for wages, in an uniform mediocrity." When Dryden took his farewell of the stage in 1694, he announced his intention of devoting himself to a translation of the whole of Virgil. On this he seems really to have laboured, and great expectations were formed of it. It was published in 1697, and proved a great success. To judge it by its fidelity as a reproduction of the original would be to apply too high a standard, but it is an interesting rendering of Virgil into the English. It was also a very open to ridicule, and was treated in this spirit by Prior and Montagu, the future earl of Halifax. Dryden's other literary services to James were a savage reply to Stillingfleet—who had attacked two papers published by the king immediately after his accession, one said to have been written by his late brother in advocacy of the Church of Rome, the other by his late wife explaining the reasons for her conversion—and a translation of a life of Xavier in prose. He had written also a panegyric of Charles, and a eulogy of James under the title of *Britannia Rediviva*, which it is interesting to compare with his other productions of the same kind.
not well be on good terms with both courts. However, he was not molested in London by the Government, and in private he was treated with the respect due to his old age and his admitted position as the greatest of living English poets. His death took place on the 1st of May 1700.

Dryden's conversion to Catholicism had a great indirect influence on the preservation of his fame. It was this which gained him the discipleship and loving imitation of Pope. He thus became by accident, as it were, the literary father and chief model of the greatest poet of the next generation. If his fame had stood simply upon his merits as a poet, he would in all likelihood have been a much less imposing figure in literary history than he is now. The splendid force of his satire must always be admired, but there is surprisingly little of the vast mass of his writings that can be considered worthy of lasting remembrance. He showed little inventive genius. He was simply a masterly littérateur of immense intellectual energy, whose one lucky hit was the first splendid application of heroic couplets to satire and religious, moral, and political argument. Upon this lucky hit superadded another, the accidental discipleship of Pope. Dryden lent his gift of verse to the service of politics, and his fame profited by the connection. It would be unjust to say that his fame was due to this, but it was helped by this; apart from the attachment of Pope, he owed to party also something of the favour of Johnson and the personal championship and editorial zeal of Scott.

The standard edition of Dryden is Scott's. There is an admirable edition of his poetical works in the Globe series, by Mr. W. D. Cooper, enlivened with an elaborate and accurate memoir and note-taking notes. His two best plays, All for Love and Don Sebastian, have recently been reprinted by Mr. J. L. Seton (W. M.)

DRY ROT, a disease in timber, apparently infectious, which occasioned the destruction of its fibres, and reduces it eventually to a mass of dry dust. It is produced most readily in a warm, moist, stagnant atmosphere, while common or wet rot is the result of the exposure of wood to repeated changes of climatic conditions. In both diseases, however, a kind of spontaneous combustion or decomposition goes on in the wood; water, carbonic acid gas, and probably carburetted hydrogen are evolved, and a putrefying substance, or humus, remains. Though the growth of fungi undoubtedly accelerates the progress of dry rot, it would seem that the true origin of the disease is the incipient decomposition of the sap in wood, and that by virtue of this decomposition the fungi obtain a nidus for their growth. The most formidable of the dry rot fungi is the species Mérulius lacrymans, which is particularly destructive of coniferous wood; other species are Polyporus hybrida, which thrives in oak-built ships, and P. destructor and Thelithena puteana, found in a variety of wooden structures. The nature of ship's cargoes has a considerable influence on the duration of their timbers,—hemp, pepper, and cotton being highly favourable, and lime and coal unfavourable, to the development of dry rot. The commonest precaution against the occurrence of that disease is to deprive the wood of its moisture by exposure to the open air; or, in other words, to season it. Charring, steaming, boiling, and smoke-curing are other modes of desiccation which have been resorted to. At one time a Mr. Lukin attempted the rapid seasoning of logs of green oak at Woolwich, and by boiling them in pulvreted charcoal; but the process, though it lessened the weight and dimensions of the wood, started its fibres from one another. He then sought to replace the moisture of heated wood by the products of the distillation of pitch-pine saw-dust; but, before the operation was judged to be complete, an explosion took place, which proved fatal to eight workmen, and wounded twelve, the experiment, therefore, was not repeated. Davison and Symington's patent process of artificial drying, which has been found to yield good results, consists in exposing the wood to a current of air moving at the rate of about 45 miles an hour, and having a temperature of 110° to 112° Fahr.

The falling of trees when void of fresh sap, as a means of obviating the rotting of timber, is a practice of very ancient origin. Vitrus divulga (iv. cap. 9) that, to secure good timber, trees should be cut to the pith, so as to allow of the escape of their sap, which by drying in the wood would injure its quality; also that felling should take place only from early autumn until the end of winter. The supposed superior quality of wood cut in winter, and the early practice in England of felling oak timber at that season, may be inferred from a statute of James I., which enacted "that no person or persons shall fell, or cause to be felled, any oaken trees meet to be barked, when bark is worth 2s. a cart-load (timber for the needful building and repairation of houses, ships, or mulls only excepted), but between the first day of April and last day of June, not even for the king's use, out of barking time, except for building or repairing his Majesty's houses or ships." In giving testimony before a committee of the House of Commons in March 1771, Mr. Barnard of Deptford expressed it as his opinion that to secure durable timber for ship-building, trees should be barked in spring and not felled till the succeeding winter. In France, so long ago as 1669, a royal decree limited the felling of timber from the 1st October to the 15th April, and, in an order issued to the commissioners of forests, Napoleon I. directed that the felling of naval timber should take place only from November 1 to March 15, and during the decrease of the moon, on account of the rapid decay of timber, through the fermentation of its sap, if cut at other seasons. The burling of wood in water, which dissolves out or alters its putrificable constituents, has long been practised as a means of seasoning. The old "Resistance" frigate, which went down in Malta harbour, remained under water for some months, and on being raised was found to be entirely freed from the dry rot fungus that had previously covered her, similarly, in the ship "Eden," the progress of rot was completely arrested by 18 months' submersion in Plymouth Sound, so that after remaining a year at home in excellent condition she was sent out to the East Indies. It was an ancient practice in England to place timber for threshing-floors and oak planks for wainscoting in running water to season them. Whale and other oils have been recommended for the preservation of timber, advantageously used; indeed the Dutch ships have been recommended for the preservation of wood; and in 1737 a patent for the employment of hot oil was taken out by a Mr. Emerson. Common salt, but for the attraction of its impurities for moisture, might be advantageously used; indeed the Dutch ship-builders, having observed that the busses in which herring were stored away in pickle lasted longer than any other craft, adopted the practice of filling up with salt, not only the vacant spaces between the planks, but also holes bored for its reception in the large timbers.

Among the many processes for the prevention of dry and wet rot in wood by impregnating it with material capable of precipitating its coagulable constituents in a permanently unsoluble and impuisscrable form, the following may be enumerated—Ryan's (1852), in which, according to Sir Humphry Davy's suggestion, a solution of corrosive sublimate is employed; Sir W. Burnett's (1836), M. Brent's (1837), Margary's (1837), and Payne's (1841), which consist respectively in the use of zinc chloride, copperas, copper sulphate, and copperas followed by sodium carbonate; and Bethell's (1835), for the treatment of the wood with crude creosote or oil of tar. The application of solution of copper sulphate, containing about a quarter of a
pound of the salt to each gallon of water, according to Margary's patent, has been found very efficacious in the case of timber not liable to the solvent action of water; but of all processes the most satisfactory is Bethell's. In this the wood is injected with heavy tar-oil in cylinders 6 feet in diameter and 20 to 30 feet in length, at a temperature of 120° Fahr., and under a pressure of 150 lb. to the square inch, so that ordinary fir timber absorbs on the average 8 to 10 lb. of the liquid per foot. Timber thus prepared has been found not only durable, but also exempt from the attacks of insects and other pests.


DU BARRY GOMARD DE VAUBERNIER, MARIE JEANNE, COUNTESS (1746-1793), mistress of Louis XV, was the daughter of Vaubernier, a clerk of the customs at Vaucouleurs, and was born there on the 19th August 1745. She received little or no education, and, coming to Paris while yet very young, she entered the house of a “mar­­chande de modes.” She soon fell a victim to the temptations which there beset her, and lived with her lover, took his place, and in concert with her governed the monarch. The favour of Louis for the courtiers and ministers was in this she succeeded; but her lover, Du Barry to form the design of receiving her into his house, in order to make it more attractive to the dupes from whom by gambling he won money to furnish him with the means of dissipation. Her success surpassing his expectations, his hopes took a higher flight, and he presented her to Lebel, valet de chambre of Louis XV, with the intention that she should become the mistress of the king. In this she succeeded; but as the favour shown by Louis to a courtesy roused murmurs in the court and remonstrances from his ministers and the members of the royal family, Louis, who was too infatuated to remove her, met their wishes half-way by securing for her a nominal husband. Count Jean Du Barry was married himself, but his brother William offered himself for the ceremony, and after its performance the Countess Du Barry was presented at court on the 22d April 1789. Her influence over the monarch was absolute until his death, and courtiers and ministers were in favour or disgrace with him in exact accordance with her wishes. The Duc de Choiseul, who refused to acknowledge her, was disgraced in 1771; and the Duc d’Alguillon, who had the reputation of being her lover, took his place, and in concert with her governed the monarch. The favour of Louis for the Countess Du Barry continued to estrange her from his children and from the royal family, and this isolation induced him to build for her the magnificent mansion of Luciennes. At his death in 1774 an order of his successor banished her to L’Abbaye-du-Font-aux-Dames, near Meaux, but the queen interceding for her, the king in the following year gave her permission to reside at Luciennes with a pension. Having gone to England in 1792 to endeavour to raise money on her jewels, she was on her return accused before the Revolutionary tribunal of having dissipated the treasures of the state, conspired against the republic, and worn, in London, “mourning for the tyrant.” She was condemned to death December 7, 1793, and beheaded the same evening.

DUBLIN, a maritime county of Ireland, situated in the province of Leinster, and containing the Irish metropolis. It is bounded on the N. by the county Meath, E. by the Irish Sea, S. by Wicklow, and W. by Kildare and Meath. While the exception of Louth and Carlow, Dublin is the smallest county in Ireland. Its greatest length is 32 miles, its greatest breadth 18; and the area is 354 square miles, or 226,585 acres.

Geology.—The greater part of the county consists on the eastern extremity of the treat bed of flint limestone that extends over the middle of the island, widening as it spreads westward. It rises in its southern part into a range of mountains, which forms the verge of an elevated district, extending thence for more than thirty miles to the south through the county of Wicklow. Through this tract a large body of granite passes in a south-western direction, commencing at Blackrock and passing by Dundrum and Rathfarnham, and forming the loftiest summit in the county, bounded on its eastern and western sides by incumbent rocks of great variety of structure and relations; micaceous schist exists at Killiney and Rathfarnham, and argillaceous schist, on both sides of the granite and quartz rock, in the eastern side alone, forming the promontory of Bray Head, and reappearing in the more northern part of the county, where it forms the picturesque peninsula of Howth, and rises to the height of 567 feet above the level of the sea. The country near Bray presents, within a small space, an instructive series of rocks; and at Killiney schistose beds are to be seen, of considerable extent, reposing on granite.

Near Booterstown, a mass of compact limestone is visible within a few fathoms of the granite. Calp, or "black quarry stone," a variety of limestones, is the prevailing rock in the immediate vicinity of Dublin, and is much used for building; and the granite of Dalkey and the neighbourhood is also much used for architectural purposes in the city and environs; quantities of it are exported to England. Petrifications abound in many parts of the limestone country. In the peninsula of Howth gray ore of manganese, brown ironstone, and brown iron-ore occur in abundance.

Surface.—The northern portion of the county is flat, and the soil good, particularly on the borders of Meath, but on the southern side the land rises into elevations of considerable height. The mountains are chiefly covered with heath, except where a substitute in the ground affords a nucleus for the formation of bog, with which about 2000 acres are covered. There are also a few small tracts of bog in the northern part of the county. The mountain district is well adapted for timber, to the growth of which some attention has lately been paid.

Coast.—The northern coast of the county from Balbriggan to Howth has generally a sandy shore, and affords only the small harbours of Balbriggan and Skerries. In the promontory of Howth, the coast suddenly assumes a bolder aspect; and between the town of Howth and the picturesque rocky islet of Ireland’s Eye an artificial harbour has been constructed, at an expense of above one-third of a million sterling, which is useful only to vessels of small burthen, and those engaged in the fisheries. Soon after the harbour was finished it was discovered that a shifting sand­­bank was likely to render the refuge quite useless; and the slow but certain filling up of the harbour is made apparent at low tide. Kingstown harbour, on the south side of Dublin Bay, is by far the best in the county. It was commenced in 1816, and was not quite finished until 1859,—at a total expenditure of £825,000. A quay runs out into the harbour to a distance of 500 feet, at which vessels drawing 24 feet of water may unload at any state of the tide. The petty harbours of Ballock and Coolmore are on this coast, the former being quite dry save at high tide, and the mouth of the latter being much higher than the bed. Balbriggan is little better, and that at Skerries is hardly to be mentioned. Opposite Coolamore harbour lies Dalkey Island, and the sound between the island and the south side of Dalkey is much used in certain conditions of weather. The island is 22 acres in extent, and stand about midway between Kingstown harbour and the beautiful bay of Killiney. North of Howth lies Lambay Island.
about 600 acres in area, the property of Lord Talbot de Malahide. Shell-fish, especially lobsters, are caught here in abundance. Small inlet lies not far off, the most interesting of which is that known as Inispatrick, noted as the spot upon which St Patrick first landed in Ireland, and where he built his first church. Ireland's Eye, off Howth, is a very picturesque rock standing on about 54 acres of grass land. It has afforded great room for geological discussion.

The fishing districts are Dublin and Howth. The chief stations are Howth and Skerries, the former of which is much used by the Manx and Cornish fishermen, who resort in considerable numbers to the harbour during the fishing season. Dublin Bay haddocks and herrings have long been esteemed, and justly, for their superior quality and flavour.

**Rivers and Mountains**—The chief river in the county is the Liffey, which rises in the Wicklow Mountains about twelve miles south-west of Dublin, and, after running about 50 miles, empties itself into Dublin Bay. The course of the river is so tortuous that 40 miles may be traversed and only 10 gained in direction. The scenery along the banks of the Liffey is remarkable for its beauty. The mountains which occupy the southern border of the county are the extremities of the great group guarding the adjacent county of Wicklow. The principal summits are the Three Rock Mountain and Garry Castle, the former having an elevation of 1536 feet, and the latter of 1596, and the group formed by Kippure and the Seefin range, Kippure being 2527, and Seefin 2150 feet high. But the grandest features of these hills are the great natural ravines which open in them, the most extraordinary being the Sculp, through which the traveller passes from Dublin to Wicklow.

**Agriculture.**—Of the 226,895 acres which form the area of the county, 100,336 acres were returned in 1871 as under tillage, 91,503 as pasture, 47,716 wood, 15,700 in towns, and 14,470 waste, bog, mountain, and water. The face of the county has indeed changed but little during the century, and the statistics as to the treatment of the soil exhibit an almost stationary result. The growth of the towns suburban to the city has made the only appreciable change, and that change has been not inconsiderable. The farms are in general small. Near Dublin, particularly on the southern side of the city, a very considerable portion of the county consists of ornamental grounds, and the rents are proportionately high.

The produce of the crops is generally greater than in any other county—not so much on account of any natural superiority in the soil, as by reason of the facilities afforded by the neighbourhood of a large city, and the greater expenditure of capital on the land. Of cereals the principal crops are oats and wheat; and of green crops, potatoes. In live stock the county is particularly rich in proportion to its extent. The following tables give the acreage of crops and numbers of stock in 1873 and 1876—

<table>
<thead>
<tr>
<th>Year</th>
<th>Grain</th>
<th>Wheat</th>
<th>Potatoes</th>
<th>Other Crops</th>
<th>Green</th>
<th>Meadow</th>
<th>MOVE</th>
<th>Other Crops</th>
<th>Clover</th>
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<tbody>
<tr>
<td>1873</td>
<td>97,985</td>
<td>5,941</td>
<td>10,107</td>
<td>59,625</td>
<td>65,042</td>
<td>40,674</td>
<td>49,789</td>
<td>59,625</td>
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<tr>
<td>1876</td>
<td>16,009</td>
<td>5,941</td>
<td>9,663</td>
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<td>49,789</td>
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<table>
<thead>
<tr>
<th>Year</th>
<th>Horses</th>
<th>Cattle</th>
<th>Sheep</th>
<th>pigs</th>
<th>Goats</th>
<th>Poultry</th>
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<tbody>
<tr>
<td>1873</td>
<td>31,068</td>
<td>54,803</td>
<td>88,604</td>
<td>20,032</td>
<td>6245</td>
<td>194,800</td>
</tr>
<tr>
<td>1876</td>
<td>20,016</td>
<td>52,770</td>
<td>64,255</td>
<td>17,017</td>
<td>6878</td>
<td>213,581</td>
</tr>
</tbody>
</table>

As regards the division of the land, the number of holdings in the county has somewhat diminished within recent years. In 1853, there were 9016 separate holdings, while in 1876 there were only 8792. According to the Owners' Returns of 1876, the county was divided in 1874 among 4100 proprietors, of whom 3256, or 61%, owned less than one acre of ground, a proportion almost identical with the average of Leinster. From the same authority it appears that the total area held amounted to 217,457 acres, giving an average of 53 acres per property (that of the province being 187), and the total valuation amounted to £686,794, giving an average of £3.2s. 2d. per acre, as against 18s. 11d. for the whole province. Fourteen proprietors owned more than 2000 acres each, and 57,992 acres in all, or 26% per cent. of the area, viz:—Charles Cobbe, 9663 acres; Earl of Howth, 7377; Sir C. W. Donville, 6252; George Woods, 4111; Sir Roger Palmer, 3974; Lord Langford, 3639; Ion Trant Hamilton, 2947; Mrs White, 3422; W. W. Hackett, 3198; Eyre Coote's representatives, 3107; B. Q. Alexander, 2973; Earl of Pembroke, 2269; Lord Annaly, 2139; Marquis of Lansdowne, 2132.

The manufactures of the county are mainly confined to the city of Dublin and its neighbourhood. There is, however, a manufacture of cotton hosiery at Balbriggan of some importance.

**Administration.**—There are nine baronies in the county:—1 and 2, Balrothery East and West, containing Rush and Lucan (population 1800), Skerries (2336), and Balbriggan (3323); 3, Coolock, containing Clontarf (3412), and several minor villages; 4, Nethercross, containing the ancient parliamentary borough of Swords (1008), and the village of Glaneuvin, 5, Newcastle, containing the village of Lucan, and Newcastle, which was represented in the Irish Parliament by two members; 6, Uppercross, and Rathdown, containing the towns of Dundrum (540), Blackrock (8089), Kingstown (16378), Dalkey (2584), and Killiney (2290), 8 Castleknock, in which is situated the Phoenix Park, and 9, Dublin, containing the city and many outlying villages. The village of Donnybrook, famous for its fair and accompanying riotous pleasure, is now part of Pembroke township, one of the richest and most beautiful suburbs of the city.

The nine baronies, including the city, are divided into 99 parishes, all within the archdeaconry of Dublin. The county proper, excluding the capital, contains 222,709 acres; the rateable property is valued at £700,854, the population at the last census (1871) was 158,936; and the number of houses, 28,803. Between 1841 and 1871 the increase of population was nearly 13 5 per cent, although between May 1851 and December 1871 there emigrated from the county 58,774 persons. In 1871, 70% per cent. of the total population were Roman Catholics in the city that denomination forms 79 per cent. The numbers of the last religious census were—Catholics, 111,934; Episcopalians, 39,269; Presbyterians, 2395, and various, 4688. There are two poor-law unions, Balrothery and Rathdown, but portions of the county are in unions situated in adjacent counties. The average daily number of paupers in the county workhouses in 1875 was 674.

Dublin is the head-quarters of the military district, and of the general commanding-in-chief and staff of Ireland.

The total number of children receiving education in 1834-26 was reported in a parliamentary return to be 23,008. In 1855, there were 159 national schools in operation, attended by 28,799 children, and in 1876 there were 52,137 children attending the national schools.

Previous to the union with Great Britain, this county returned ten representatives to the Irish Parliament,—two for the county, two for the city, two for the university, and two for each of the boroughs of Swords and Newcastle. The number of representatives was reduced to five by the Act of Union, one member being withdrawn from the university, and the boroughs of Swords and Newcastle disfranchised. The Reform Act of 1832 restored the second member to the university, leaving the representatives in other respects unchanged.
History.—It is stated by Ptolemy that the county Dublin was inhabited by the tribe of the Ethans, who swelt for the most part in Meath county, but on their settling in Dublin founded the city Eblans, now presumed to be Dublin. Later writers affirm that the Ethans were driven out by the Danes, who held sway until the battle of Clontarf (1014) resulted in the overturn of their power. When the English landed, the people to the north of the Liffey were known among the Irish as Fingale, or white foreigners, and those living south of the river were called Duakghall, or black foreigners. The Rev. Caesar Otway professed to be able to discern signs of the different races even as late as his day; but the modern observer will fail to catch any marks whereby different portions of the community may be distinguished.

In 1210, King John formed this district into a county, comprising the chief portion of country within the English pale. The limits of the county were, however, uncertain, and underwent many changes before they were fixed. Although so near the seat of government, 67,142 acres of profitable land were forfeited in the Rebellion of 1641, and 34,536 acres in the Revolution of 1688. In 1662 the boundaries were definitely marked, the country inhabited by the O'Toole's and the O'Byrnes being formed into the county of Wicklow. The absence of any considerable towns decreases the interest in Dublin county, and it has no historic fields to boast of. In 1867 the most formidable of the Fenian risings took place near the village of Tallaght, about seven miles from the city. The rebels, who numbered from 500 to 700, were found wandering at dawn, some by a small force of constabulary who, having in vain called upon them to yield, fired and wounded five of them, but the great bulk of them were overtaken by the troops under Lord Strathearn, who captured them with ease and marched them into the city.

In the reign of James II. the population of Dublin was 64,483; in 1728 it had more than doubled; in 1753 it was 161,000; in 1798 Whitelaw estimated it at 192,000; according to the first census taken in 1821, it was 185,881; it was 232,726 in 1841, 254,808 in 1861, and 246,326 in 1871. This last decrease is due to the recent increase in wealth and the consequent extra-city residence of the traders and merchants. The suburbs of Dublin have wonderfully improved within the past twenty years, and constitute at present the chief of the many attractions which the stranger is wont to admire. The outlying townships of Rathmines and Rathgar, Kingswood and Donnybrook, Clontarf and Dalkey, are all inhabited by persons engaged in the commerce of the city. If we include these populations, the city may be said to contain about 330,000 souls. The parliamentary borough, whose limits are more extensive than much of the munifico population, covers an area of 3501 acres, and contained in 1871 a population of 207,717 persons. It returns two members to the imperial parliament.
The rainfall is nearly 33 inches; rain or snow falls on 200 days per annum; and the wind blows from the N. or E. for 120 days. The average death-rate is 27 per 1000.

The plan of the city is singularly simple. The Liffey flows almost through the centre from west to east, and the bridges connect long lines of streets running north and south. The communications between the two sides of the city are ample, there being 9 bridges in a distance of about a mile and a half, and ferries for the two miles of shipping between the last bridge and the mouth of the river. Sackville Street is the finest avenue in Dublin; the houses, however, are not uniform, and the street is not long enough for its width, while the Nelson Pillar, itself a beautiful object, blocks the View and prevents the mass of the houses from being properly seen. It is therefore necessary to have a purlieu, a small street or walk, which will be in the space between the last bridge and the mouth of the river.

The condition of the various orders of the community is perhaps best shown by citing the census returns as to the number of families occupying the four different classes of houses. There were 5635 families in houses of the 1st class, 10,223 families in the 2d class, 10,619 in the 3d class, and 25,723 in the 4th class. The 58,110 families thus hold 23,896 houses. Another way of estimating Dublin society is by taking the occupations of the people. In 1871 there were 267 lawyers in Dublin, 256 barristers, 370 attorneys, 49 architects, 215 accountants, 460 bootmakers, 296 tailors, 19,509 domestic servants, 83 photographers, 1000 coachmen and coachwomen, 1600 drapers and mercers, 1250 carmen and carriers, 936 cabinetmakers, 3500 clerks, 177 civil engineers, 394 fishmongers, 36 glovers, 376 physicians, 11,530 labourers, 4500 milliners, 1477 printers, 31 sculptors, 223 watch and clock makers, 458 wine and spirit merchants.

Judges, lawyers, and doctors may be said to constitute the higher society of Dublin, of the 182 peers of Ireland only two have residences in the capital.

The lord lieutenant lives in Dublin Castle in winter, and in the Viceregal Lodge, Phoenix Park, in summer. He is assisted in the executive by a privy council, nominated by the Crown, and his chief secretary, who must have a seat in the House of Commons. Lords justices govern in the temporary absence of the lord-lieutenant—the lord chancellor, the commander-in-chief, and another privy councillor usually being appointed. Prior to the Act of 1863 disestablishing and disestablishing the Irish branch of the Established Church, the archbishop of Dublin was invariably named a lord justice, but in future the archbishop may or may not have a seat at the Council Board.

Dublin is the seat of the Irish courts of law and equity, from which appeal lies only to the House of Lords. The judicial functions are exercised by the lord chancellor, a lord justice of appeal, a vice chancellor, the master of the rolls, and four judges in each of the three classes of Queen's bench, common pleas, and exchequer. There are also judges (1) in the court of admiralty, (2) in the bankruptcy court, and (3) in the landed estates court for the sale and transfer of estates in Ireland. The recorder's court determines civil bills and city criminal cases.

Local Government. The municipality is under the government of the lord mayor and corporation. Previous to the Municipal Reform Act of 1840 the corporation consisted of the lord mayor, 2 sheriffs, 24 aldermen, 124 common councilmen, 28 sheriffs, and 96 representatives of the 25 civic guilds. At present the corporation consists of 15 aldermen and 45 councillors, being 6 geason alderman and 3 councillors for each of the 15 wards into which the city is divided. An alderman or councillor is annually elected lord mayor. The income of the body arises from rents on property, customs, and taxes. The yield in 1872 was £296,604, the expenditure £255,944, and the debt £337,476. The debt in 1875 was £296,604, the expenditure £255,944, and the debt £337,476. Under an Act passed in 1817 the corporation have the right to form and every year three names of persons eligible for the office of high sheriff to the viceroy, one of which shall be selected by him. The lord mayor holds a weekly court for debts above 40s. and under £10, and for the settlement of cases between masters and servants. He is also clerk of the markets, and supervises weights and measures and deals with cases of adulteration. A court of consistory determines debts under 40s. and is presided over by the last ex-mayor. A competent fire-brigade is maintained by the corporation. The average number of fires per annum is between 60 and 65; 12 lives have been lost in ten years, and property to the value of £485,800 has been saved in the same period. The city coroner is a corporate officer. There were 422 incipits in 1875. Under an Act applicable only to Dublin the local rates are collected by a collector-general, and are distributed by him to the different authorities concerned.
Irish Constabulary. The police are under the control of two commissioners, and consist of 7 superintendents, 76 inspectors, 64 sub-inspectors, and 440 constables. A local police rate of 8d. in the £1 produces about £30,000 a year; and the taxes on hackney cars, driven licenses, pawnbrokers' licenses, and publications of the police rules, average about £16,000. These two sums (£44,000), together with a Treasury grant averaging £26,000 a year, maintain the force, and pay the commissioners and superintendents and the four police magistrates. The police are inspectors of the hackney carriages, which number nearly 2000. They carry out the laws affecting the sale of liquor, and the number of houses in Dublin is 1012. A farce of the crime and offences committed in the city is afforded by the following statistics taken from official sources—Number of persons arrested (1876, 45,439), number convicted either summarily or after trial before a superior judge, 59,920; of those convicted, 12,348 (6627 males and 4719 females) were charged with drunkenness; 88 persons were sentenced to penal servitude (68 for five years); and 400 were sent to jail. Quarter sessions are held in the city by the recorder; and a commission of oyer and terminer is held twice a year by two of the superior judges.

Military.—A large military force is usually maintained in the city. Dublin which is the headquarters of the military district of Dublin and of the staff of Ireland, consisting of the commander of the forces, adjutant-general, and quartermaster-general. The troops are accommodated in seven barracks, the most extensive of which is the Royal Barracks, consisting of five squares, affording quarters for 10 field officers, 83 officers, 2000 non-commissioned officers and privates, and 460 horses, together with a hospital for 260 patients. Richmond Barracks, for infantry, occupies an elevated healthy situation, on the banks of the Grand Canal, beyond Kilmainham, forming a substantial fabric, with extensive exercise grounds and yards, covering altogether an area of 18 acres, and furnishing accommodation for 76 officers and 1600 non-commissioned officers and privates, and stabling for 260 horses, and a hospital for 100 patients. Portobello barracks, for cavalry and artillery, is on the bank of the same canal, near Harold's Cross, and can accommodate 80 officers and 560 non-commissioned officers and privates, stabling for 460 horses, and a large hospital. At Island Bridge, near Kilmainham, there is an extensive artillery barrack, and there is another for artillery at the Pigeon House Fort in the bay. Beside these, there are barracks for infantry at Great Ship Street, near the castle; at Aldborough House, a fine massive building erected in 1765 at a cost of £45,000; and at Beggar's Bush, on the South Circular Road. In the Phoenix Park is Mackenzie's Fort and magazine. The magazine is surrounded by a dry ditch, and is entered by a drawbridge. It is defended by a dozen 24-pounders.

Poor Law.—There are two poor law unions in the city—North and South, governed by two boards of guardians. The average daily number of paupers in both is 4832, and the annual expenditure of both £74,560.

Religious.—The following tables show the population of the different religious denominations in 1841, 1851, 1861, and 1871, and the number of Roman Catholics and Protestants of the Episcopal church in each parish (when part is mentioned, the rest of the parish is in Dublin county):

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<tbody>
<tr>
<td>Christ Church (L/Sharing beggarly)</td>
<td>15,086</td>
<td>14,906</td>
<td>15,286</td>
<td>15,456</td>
<td>5,555</td>
<td>4,450</td>
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<td>7,438</td>
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<td>7,219</td>
<td>7,198</td>
<td>4,350</td>
<td>2,800</td>
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<td>8,164</td>
<td>4,160</td>
<td>2,000</td>
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<td>19,183</td>
<td>19,119</td>
<td>11,329</td>
<td>7,299</td>
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<tr>
<td>St. George's, part of</td>
<td>16,086</td>
<td>15,906</td>
<td>15,319</td>
<td>15,311</td>
<td>6,186</td>
<td>3,940</td>
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<td>3,858</td>
<td>3,845</td>
<td>3,839</td>
<td>3,850</td>
<td>2,650</td>
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<td>St. Patrick's Cathedral</td>
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<tr>
<td>St. Patrick's (L/Sharing beggarly)</td>
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<td>St. Thomas's</td>
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<td>St. Stephen's</td>
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Total | 265,926 | 265,926 | 265,926 | 265,926 | 147,111 | 119,815 |

Besides the above mentioned religious denominations there were 4517 Presbyterians, 1853 Baptists, and 4904 of "other persuasions." The proportion of Catholics to the total population was equal to 79 per cent.

Education.—The means of education in Dublin are ample. The incessant contests between the various religious denominations have had the effect of imparting energy to all engaged in teaching.

Trinity College, founded by Queen Elizabeth, is the greatest foundation in the country. The corporation now consists of a provost, 7 senior fellows, 26 junior fellows, and 70 scholars. Two studentships, one mathematical and one classical, have been recently added to the honour list. The successful competitor is entitled to £100 a year for seven years; there are no duties to be fulfilled and no residence is required. A vacancy among the fellows is filled up by the provost and a select number of the fellows, after a very severe examination for ten days in metaphysics, mathematics, natural philosophy, ethics, history, chronology, Latin, Greek, and Hebrew. Fellowships are held for life. Until the year 1840 the fellows were bound to celibacy, but that restriction was then removed. The scholars are chosen from among the undergraduates, after an examination in mathematics or Greek and Latin. The pecuniary advantages attaching to scholarships lasts for four years. Students, after an examination, are admitted as fellows, companions, pensioners, or sizars; the last class is limited to thirty, and is partially maintained out of the College funds. Noblemen, noblemen's sons, and baronets have the privilege of forming a separate order with peculiar advantages, on the payment of additional charges. The course of general instruction extends over four years, the principal studies of each year being successively mathematics, logic, natural philosophy and astronomy, classics, and ethics; and four commencements are held every year for the purpose of conferring degrees. A medical school is attached to the university, and also a school of civil engineering, and diplomas in surgery and civil engineering are granted by the board on the completion of the prescribed courses. The library, which is one of the four scheduled in the Copyright Act, consists of about 190,000 printed volumes and 1500 manuscripts; and the number is increased annually by about 2000 volumes, partly purchased and partly obtained free under the Act. There are also a botanic garden and a museum. The funds of the College, arising from lands and the fees of the students, are managed solely by the provost and seven senior fellows, who form a board, to which also the Academic Council, the whole governing body and literary, both in its executive and its legislative branches, is committed. The buildings, which include a large extent of ground, now nearly in the middle of the city, consist of one very large and two smaller squares. In these is the chapel, the hall for examinations, the museum, the library, the dining hall, the printing office, and chambers for the fellows and students. Attached to the buildings is a large park for the recreation of the students, and a smaller enclosure for the provost and fellows. The provost's residence and the medical school are apart from the main body of the buildings. The college library is at Dunsmuir, about five miles north-west of Dublin; it is amply furnished with astronomical instruments. It was endowed by Dr Francis Andrews, provost of Trinity College, was erected in 1785, and in 1791 was placed by statute under the management of the Royal Astronomer of Ireland, an appointment first filled by Dr Henry Usher, and subsequently by Dr Brunckley, bishop of Cloyne. The Magnetic Observatory of Dublin was erected in the years 1837–8, in the gardens attached to Trinity College, and at the expense of the university. A series of observations was begun in 1838, and has been continued ever since. The annual income of
Trinity College is set down as about £65,000 a year. The average number of students on the books is about 1300. By an Act passed in 1875, known as Fawcett's Act, all tests were abolished, and the prizes and honours of all grants hitherto reserved for Protestants of the Established Church were thrown open to all. Examinations for women are now held under the direction of the College.

The Queen's University, founded in 1850, has quarters in Dublin Castle; but the three colleges are in Cork, Belfast, and Galway. Dublin has no share in the advantages of the university, which are considerable.

The Roman Catholic University derives its entire support from voluntary contributions. There is an annual collection on a certain Sunday in November, and this realizes about £3000. The management is in the hands of the Catholic bishops. The medical school in connection with the university has attained great repute in Ireland.

The Royal College of Science, controlled by the Science and Art Department, is conducted by ten professors. The number of students is said to be greater than 30, amongst whom four royal scholarships and some royal exhibitions (value £50 for two and three years respectively) are divided. The Parliamentary grant is £6902 per annum. The Royal Dublin Society and the Royal Irish Academy are devoted to science and art. The one receives £7500 a year, and the other £1300. The Royal Dublin Society's Act is £200, and the National Gallery £2340 a year. The Zoological Society, having its gardens in the Phoenix Park, has £500 a year.

Schools—In 1871 there were in the city 356 schools—257 primary and 198 higher. In attendance at the primary schools were 16,782 Roman Catholics, 4692 Episcopalian, and 842 Presbyterians, and some for orphans, for the unemployed, some for the orphan daughters, and for women. The total of 29,617 were illiterate. Dublin was, by Government, receives a grant of £100, donations, &c., from voluntary contributions. There is a constant supply of boarders, from whom four royal scholarships and 1242 Presbyterians and others; in attendance at the superior are 1491 Roman Catholics, 234 Presbyterians, and 1566 Presbyterians and others. This gives a general total of 59,617.

The education of all classes in Dublin is shown in the following figures—In 1871, 162,561 of seven years and upwards could read and write, 24,224 could read but could not write, and 55,633 were illiterate.

Charities—Dublin can boast a goodly number of charities. There are 113 charitable institutions, some for the deaf and dumb, the blind, the destitute, the distressed, the unemployed, for the education of the reduced, and for the sons and daughters of clergy-men, and some for orphans, for idiots, for convalescent patients. The Royal Institution, for the daughters of soldiers, was established in 1864 by a Scotch gentleman named Drummond, who left £20,000 to found the asylum. The Hospital and Foundling Institution, commonly called the Blue School, was founded in 1760. About 1860, the school buildings are very handsome, and cost £21,000. The annual income is £4000 a year. The education is of a very superior character. In 1850 the Irish Parliament House were erected the parliament met in the school building. Molyneux Asylum for the blind, a splendid building near the city, is a refuge and instruction to 70 females. There are 90 hospitals, of which the chief are—the Westmoreland Lock, parliamentary grant £2300; Stevens, parliamentary grant £1300, donations, &c., £4177; the Meath, parliamentary grant £500, city grant £750, donations £1915, Cork Street Fever, parliamentary grant £2250, donations £1295; House of Industry Hospitals (3), parliamentary grant £4743, donations £593; Rotonde Lyng-in, parliamentary grant, £700, city £300, donations £3287; Cleebe Lyng-in, parliamentary grant £290, city £360, donations £1977; Incurables, parliamentary grant £250, city £110, donations £4000, St Mark's Eye and Ear, parliamentary grant £106, city £100, donations £735. These 11 hospitals in all, are maintained and received from Parliament, £15,722, from the city authorizes £1560, from subscriptions £19,853. Total income of all £26,636. Of the houses supported by voluntary contributions the Adelainers (Protestant), the Mater Misericordiae, St Vincent's, and the City of Dublin hospitals are the most important.

The principal institutions for the blind are the Institute of the Holy Name, founded in 1745, pursuant to the will of Dean Swift, and conducted by governors appointed by the charter of incorporation. The Richmond Lunatic Asylum, erected near the House of Industry, and made use of by the lunatics, was, by special act of the legislature, in 1782, converted into the Royal Lunatic Asylum. The Roman Catholic Church has charge of a number of special charities, some of them educational and some of them for the relief of suffering.

Libraries, &c.—The principal library in Dublin, for the number and value of its books, is that of Trinity College. It is open to all, whether they are students of that university, but admission is obtained by others by special favour. It contains about 120,000 printed volumes, and 1500 manuscripts. The King's Inns Library is next in value. The right of reading in it is confined to the members of the King's Inn's Society. There are, besides, barristers, attorneys, and law students. Marsh's Library, attached to St. Patrick's, founded by Dr. Marsh, in 1654, contains about 15,000 volumes, and is open to the public, but, from the very small portion of its funds appropriated to purchase, it is very deficient in modern publications. It possesses some valuable manuscripts. The want of a library is partly supplied by the tracts and works printed under the request of the society, for sale, and the purchase of which is attempted to be supplied by a society formed in 1791 (the Dublin Literary Society), which collected a large number of books, tracts, and works, and the sale of which is managed by the committee of the society.

The Royal Irish Academy's Library is valuable of its kind. It contains many ancient manuscripts, and works dealing with science and antiquities.

Public Buildings.—Dublin has several noble edifices. The first and greatest is the Bank of Ireland, formerly the House of Parliament, which occupies five acres. There are three fronts. The principal, towards College Green, a colonnade of the Ionic order, formed of a façade and two projecting wings, for much admirability of its elevation. The western front, a portico of four Ionic columns, is connected with the other by a colonnade of the same order, forming the quadrant of a circle. The eastern front, which was the entrance of the House of Lords, was, by their special wish, a colonnade of the Corinthian order, which the architect found great difficulty in uniting with the other parts. The apartment for the Lords, a fine room, is hung with tapestry. That of the commons, having been burned in 1792, was reconstructed after a more elegant design, in the form of a circle surrounded by pillars, between which was a gallery for hearers. This fine hall was taken down by the bank directors, and converted into a square room, now the cash-office. The House of Lords remains in its original condition, and is but seldom used.

Trinity College is in itself a source of legitimate pride to the city. The front is plain and the courts are large and well proportioned. On the left is the examination hall, containing full length portraits of the queen founder, of Molynex, of Edmund Burke, Bishop Berkeley, and other celebrities. On the right stand the chapel and the dining hall, both by the same architect. The dining hall is a very handsome interior, and the latter having portraits of...
The installations for municipal purposes. The centre hall contains statues and monumets; the river, 315 feet stands on the site of the ancient Dominican monastery of entablature and cornice; on the apex is a figure of Hibernia,ing portico of six fluted Ionic columns, supportmg land, whose tomb the church lands were accustomed to pay their rents. The building. It is in possession of the corporation, and is used projectmg cornice. The other three fronts are composed of which may be seen to advantage. The south front, facing the Church consists of a boldly projectmg campanile. The library presents a rather motley appearance. The greater portion of it is dingy, being built of brick; but the chapel and tower are very handsome. The castle stands on ten acres, but the apartments are small, with the exception of St Patrick's Hall, which is used on the occasion of investing knights of the order of St Patrick. 

The custom-house is considered one of the chief ornaments of the city. It was erected at a cost of about £400,000, and opened in 1791. It stands on the north side of the river below Carlisle Bridge, and presents four fronts, three of which may be seen to advantage. The south front, facing the river, 375 feet in length, is built of Portland stone, finished in the Doric order, with an entablature and bold projecting cornice. The other three fronts are composed of granite, and from the centre rises a dome to the height of 125 feet, surmounted by a figure of Hope.

The Four Courts, in which the superior courts are held, stands on the site of the ancient Dominican monastery of St Saviour, on King's Inn Quay. It is an extensive and imposing structure, erected between the years 1785 and 1800, at a cost of £200,000.

The city hall, formerly the royal exchange, is a handsome building. It is in possession of the corporation, and is used for municipal purposes. The central hall contains statues of George III., of Grattan by Chantrey (a superb work), of O'Connell by Hogan, of Lucas, and of Drummond.

The post-office stands in Sackville Street. It is built of granite, and is about 120 feet high, 255 in length, and 150 in depth. The centre of the front consists of a boldly projectmg portico of six fluted Ionic columns, supporting an entablature and cornice; on the apex is a figure of Hibernia, and Mercury and Fidelity at the sides. The first stone was laid in 1815, and the cost of the pile was £50,000.

Churches.—St Patrick's Cathedral, a noble edifice, was restored by the late Sir Benjamin L. Guinness, Bart., at a cost of £130,000; Christ Church Cathedral is now in course of restoration by Mr Henry Roe, and the estimated cost is much over £100,000; Mr Roe has also presented a synod house to the Church of Ireland at a cost of £27,000; the late Mr Findlater gave the Presbyterian body a beautiful church which he erected at a cost of £6,000; the Roman Catholics have raised about 16 magnificent edifices in the last twenty years; most of the Protestant parish churches have been either rebuilt or restored; the Unitarians have two houses, one of them of noble aspect; and the Methodists, the Moravians, the Friends, the Baptists, and the Jews have all provided themselves with suitable places of worship. There are no less than 93 churches of all denominations and a synagogue in Dublin, and at least 70 of these are beautiful modern buildings.

The two cathedral churches of St Patrick and Christ Church are superior to all other edifices in character and interest. The foundation of Christ Church, the older building of the two, is attributed to the Danes in 1038; but it dates its elevation to a deanery and chapter from 1541. The entire length of the nave and choir is 250 feet, that of the transept 110 feet, and the extreme breadth of either 80 feet. Christ Church does not contain many monuments. Among the most interesting is that of Strongbow, the invader of Ireland, whose tomb was long the place at which the tenants of the church lands were accustomed to pay their rents. The monument was injured by the fall of one of the cathedral walls; but it was afterwards repaired, and is still to be seen in good preservation, with a smaller tomb by its side, supposed to be that of Strongbow's son, who was killed by his father. Synods were occasionally held in this church, and parliaments also, before the Commons' Hall was destroyed in 1565 by the accidental explosion of 144 barrels of gunpowder in a neighbouring street. Here also the impostor Lambert Simnel was crowned.

The cathedral of St Patrick was founded in 1190 by John Comyn, archbishop of Dublin. It was burnt about a hundred years after its first erection, but was again raised from its ruins in increased splendour. At the Reformation it was dissolved, and the building was used for some of the purposes of the courts of justice. Edward VI. contemplated its change into a university, but the project was defeated and a university established elsewhere. In the succeeding reign of Mary, St Patrick's Cathedral was restored to its primary destination. The installations of the knights of St Patrick, the first of which took place in 1783, were originally held here. This cathedral contains the monuments of several illustrious persons, among which the most celebrated are those of Dean Swift; of Mrs Hester Johnson, immortalized under the name of "Stella:" of Archbishop Marsh; of the first earl of Cork; and of Duke Schomberg, who fell at the battle of the Boyne. The tablet over Schomberg's grave contains what Lord Macaulay calls a "furious libel." In the cathedral may be seen the chain ball which killed St Ruth at the battle of Aughirm, and the spurs which he wore when shot. A fine statue of Sir Benjamin Lee Guinness, Bart., the restorer of the cathedral, stands in the aisle.

The Roman Catholic churches are for the most part old and in poor localities. The new churches are, however, of greater proportions and of considerable beauty. The principal is the church of the Augustinians in Thomas Street. This is perhaps the loftiest building in the city. The pro-cathedral in Marlborough Street is a building of great dimensions, highly ornamented internally in the Grecian style, and having a fine Doric portico forming the principal front. The building was commenced in 1816, at an estimated cost of £52,000. St Paul's, on Arran Quay, is an elegant building in the Ionic style. The church of St Francis Xavier was erected at a cost of £18,000, from a Roman Ionic design.

Places of Amusement, &c.—Dublin has a winter palace, on the plan of the London Crystal Palace. The scheme advancing public entertainment failed, and Sir Arthur Guinness, Bart., purchased it from the subscribers for £13,000. It is used now for various purposes. There are three theatres—the Royal (second in size only to Drury Lane and Covent Garden), the Gaiety, and the Queen's Theatre. There are two or three musical societies, which are supported by the middle classes; but very little music of a superior character is afforded to the citizens at large.

The Phoenix Park, just touching the north-west boundary, is seven miles in circumference, and includes an area of 1759 acres. The park is in itself beautiful, and the nearness of the Dublin and Wicklow mountains adds greatly to its attractions. The Viceregal Lodge and the Chief Secretary's Lodge are the only buildings inside the gates. They have little pretension beyond their size.

Monuments.—There are nine of Foley's best statues in Dublin—the Prince Consort, Grattan, Burke, Goldsmith, Guinness, Stokes, Corrigan, and Lord Carlisle; and that of O'Connell may be added. Among the other memorials is that of Strongbow, the invader of Ireland, whose tomb was long the place at which the tenants of the church lands were accustomed to pay their rents. Wellington's monument stands in the Phoenix Park, on an obelisk 200 feet high, bearing on the sides the names of his victories, and scenes in relief from the greater battles on the pedestal. There are statues to King William,
to Smith O'Brien, to Lord Eglinton, to William Dargan, to Nelson (already noticed), and to Thomas Moore.

Commerce.—Dublin has little of the bustle which should mark so large a city, and as a matter of fact Belfast is said to transact a greater general trade. There is, too, a spirit of foolish pride which tends to disguise trade; and the tendency to be poor and genteel in the civil service, at the bar, in the constabulary, in the army, in professional life, rather than prosperous in business, is one of the most unfortunate and strongly marked characteristics of Dublin society. That this is attributable to the lingering yet potent influence of an unhappy past is held by some; while others attribute the weakness to the viceroy's office and the effects of a sham court. About the tune of the legislature there occurred many events which were passed, and they entered, and 213 cleared the port of Dublin; and porter. The whisky trade has been greatly extended. All exportation was soon stopped, and the custo...
In 1534 Lord Thomas Fitzgerald, better known as Silken Thomas, or because of a fantastic fringe was in the helmet of his followers), a young man of rash courage and good abilities, son of the Lord Deputy Kildare, believing his father, who was imprisoned in the Tower of London, to have been beheaded, organized a rebellion against the English Government, and marched with his followers from the manor of the septs of Kildare, in Thomond County, through Duan's Gate to St. Mary's Abbey, where, in the council chamber, he proclaimed himself a rebel. On his appearing before the wall with a powerful force, the citizens were misled into the belief that he was afraid to give admission of his troops to besiege the castle, but, on hearing that he had met with a reverse in another quarter, they suddenly closed their gates and detained his men as prisoners. He then attacked the city itself, but, finding it too strong to be seized by a coup de main, he raised the siege on condition of being allowed to carry away a number of the children of some of the principal citizens who had fallen into his hands. After much resentment of fortune, Lord Thomas and others concerned in it were executed at Tyburn in 1536.

At the breaking out of the civil war in 1641, a conspiracy of the Irish septa, under the direction of Roger Moore, to seize Dublin Castle, was disclosed by one Owen Connolly on the eve of the day on which the attempt was to be made, and the city was thus preserved for the king's party; but the Irish without commenced an indiscriminate extermination of the Protestant population. In 1648 Dublin was besieged, but without success, by the Irish army of 16,000 foot and 1600 horse, under the guidance of the Prince Thomas Rumpa, and others, banded together to restore and establish in Ireland the exercise of the Roman Catholic religion. The city had been put in an effusive state of defence by the government, and, in the following year, to prevent it falling into the hands of the Irish, the government ordered it on condition to Colonel Jones, commander of the Parliamentary forces. In 1649 Ormond was totally defeated at the battle of Aughrim, near Old Rathmines, in an attempt to recover possession. The same Cromwell landed in Dublin, as commander-in-chief under the Parliament, with 2000 foot and 600 horse, and proceeded thence on his career of conquest.

When James II. landed in Ireland in 1689, to assert his right to the British throne, he held a parliament in Dublin, which passed several acts of attorney in favour of 3000 Protestants. The governor of the city, Colonel Luttrell, at the same time issued a proclamation ordering all Protestants not housekeepers, excepting those following some trade, to depart from the city within 24 hours, under pain of death or imprisonment, and restricting those who were allowed to remain in various ways. In the hope of relieving his financial difficulties, the king erected a mint, where money was coined of the "worst kind of old brass, gun, and the refuse of metals, melted down together," of the nominal value of £1,586,800, with which his troops were paid, and tradesmen were compelled to receive it under penalty of being hanged in case of refusal. Under these regulations the entire coinage was put into circulation. After his defeat the battle of the Boyne, James returned to Dublin, but left it again before daybreak the next day; and William III. advancing by slow marches, on his arrival encamped at Juncas, and having decided to attack the town, moved forward the following day to lay siege to St. Patrick's Cathedral to return thanks for his victory.

In 1768 a convention of delegates from all the volunteer corps in Ireland assembled in Dublin for the purpose of procuring a reform in parliament, but the House of Commons refused to enter into the proposition, and the convention separated without coming to any practical result. In May 1798 the breaking out of a conspiracy planned by the United Irishmen to seize the city was prevented by the capture of Lord Edward Fitzgerald, son of the duke of Leinster and husband of the celebrated smeared of ruin. Lord Edward was in prison for the wounds received in the encounter which preceded his capture.

In 1800 the Act of Union between Great Britain and Ireland was passed in both parliaments, and on the 1st January following the imperial standard of the United Kingdom was hoisted on Dublin Castle.

In 1803 an insurrection, headed by Robert Emmett, a young barrister of much promise, broke out, but was immediately quelled, with the loss of some lives in the tumult, and the death of its leaders on the scaffold. In 1848 William Smith O'Brien, M.P., for Limerick, raised a rebellion in Tipperary, and the lower classes of Dublin were greatly agitated. O'Brien, however, to tame and judicious disposition of the military and police forces the city was saved from much bloodshed. In 1867 the most serious insurrection contemporary, that known as the Fenian conspiracy, came to light. The reality of it proved by a ship being found laden with gunpowder in the Liverpool docks, and another with 4000 pikes heads in Dublin. The Habeas Corpus was suspended at one sitting by both Houses of Parliament and about 500 arrests were made in Dublin in a few hours. Dublin城堡 was fortified; and the citizens lived in a state of terror for several weeks together.


DUBNO, a town in European Russia, the seat of a department in the government of Volhynia. It lies 154 miles west of Zhitomir, in 50° 25' N. lat. and 25° 4' E. long. Occupying a peninsula formed by the river Iva, it is almost surrounded by water and marsh; and in its eastern corner it is defended by a somewhat dilapidated citadel separated by dry ditches from the rest of the town. It also possesses five Greek churches, of which two—the Transfiguration and the Exaltation of the Holy Rood—were formerly monasteries; it also has a Roman Catholic church and convent, a Jewish synagogue, a hospital for poor Jews, and various other Jewish institutions. Beer, mead, tobacco, bricks, and leather are all manufactured in the town; but a large number of the inhabitants, who are mainly of Jewish blood, obtain their living in other places.

Dubno is first mentioned in the chronicle under the name of Duben in 1100, when it formed one of the towns offered to David of Vladimir in compensation for the loss of his principality. In 1148 it received a charter from the grand duke of Lithuania, which was afterwards changed about 1507 for the Magdeburg rights. The Tartars, against whose attacks it had been so long subjected, in the 17th century, laid waste the neighbourhood in 1577, but were gallantly repulsed from the town by Yarush of Ostrog. In 1793 it passed into the possession of the Polish nation, but its ground-rent is still due; in 1795 it was incorporated with Russia, and in 1796 it received its present rank. Population, 7600.

DUBOFKA, a burgh in European Russia, in the government of Saratoff, about 324 miles to the N.N.W. of Tarnowitz, on the right bank of the Volga, near its junction with the river Dubofka, and on the post-road from Astrakhan. With the exception of about 200, all the houses are built of wood; but among its public buildings it numbers four Greek churches, a prison, a large public school, and a hospital capable of containing several hundred patients. Besides leather, tallow, soap, and tobacco, its inhabitants manufacture mustard on a large scale, obtaining the seed partly from their own fields and partly from other districts. They had formerly a very extensive share in the transport trade between the Volga and the Don, which was largely carried on by means of oxen, and supported a number of auxiliary crafts; but the opening of the railway about 1860 struck a sudden and fatal blow at the trade. A great fair, lasting for a whole month, is held in the town every year, and produces a circulation of about 1,000,000 rubles, or upwards of £141,000. Dubofka, already in existence at an earlier date, was colonized by Cossacks in 1745, and became their chief settlement on the Volga, the residence of their ataman, and the seat of their military chancery. In 1770 it was fortified with wooden ramparts by Falk. Having given its support to the insurrection of Pugachev, it was punished by the removal of 517 of its inhabitants to the Caucasus, where they formed a separate polt, or regiment. Their place was supplied by immigrants from the neighbouring governments and the country of the Little Russians, who were soon led by the advantages of their position to devote themselves exclusively to trade. Population in 1873, 12,737.

DUBOIS, Guillaume (1656-1723), cardinal, archbishop of Cambrai, and first minister of France, was born at Brives-la-Grille, in Limousin, September 6, 1656. He was the son of an apothecary, and at twelve years of age was sent to Paris to study in the college of St Michael, where he at the same time served in the household of the principal. He then engaged himself as a private tutor, and at length was appointed preceptor to the young duke of Chartres, afterwards the regent duke of Burgundy. As a youth, astute, ambitious, and unrestrained by conscience, Dubois ingratiated himself with his pupil, and, while he gave him
formal school lessons, at the same time pandered to his evil passions, and encouraged him in their indulgence. He gained the favour of Louis XIV. by bringing about the marriage of his pupil with Mademoiselle de Blous, a natural but legitimated daughter of the king; and for this service he was rewarded with the gift of the abbey of St Just in Picardy. He was present with his pupil at the battle of Steunilkirk, and "faced fire," says Marshal Luxembourg, "like a grenadier." Sent to join the French embassy in London, he made himself so active that by the request of the ambassador he was recalled. When the duke of Orleans became regent (1715), Dubs, who had for some years acted as his secretary, was made councillor of state, and the chief power passed gradually into his hands. His ambition grew with what it fed on. To counteract the intrigues of Cardinal Alberoni, first minister of Spain, he suggested an alliance with England, and succeeded in negotiating the Triple Alliance (1717). He was now made minister of foreign affairs. But he coveted the chief dignities of the church no less than political offices; and he impudently prayed the regent to give him the archbishopric of Cambrai, the richest in France. His demand was supported by George I, and the regent yielded. In one day all the usual orders were conferred on him, and even the great preacher Masillon consented to take part in the ceremonies. His next aim was the cardinalate, and, after long opposition on the part of the Pope, Clement XI, the red hat was given to him by Innocent XIII. (1721). In the following year he was named first minister of France (August). He was soon以後 at the French Academy; and, to the disgrace of the French clergy, he was named president of their assembly. While the projects of Law were bringing financial ruin upon the kingdom, Dubois was accumulating from various sources an immense private fortune. In addition to his share possessed the revenues of seven abbeys. He was, however, a prey to the most terrible pains of body and agony of mind. His health was ruined by his debaucheries, and a surgical operation became necessary. This was almost immediately followed by his death, at Versailles, August 10, 1723. His portrait was thus drawn by the duke of St Simon. "He was a little, pitiful, wizened, hermaphrodite man, in a flaxen coat, his face surrounded by some intellect. All the vices—perfidy, avance, debauchery, ambition, latracy—fought within him for the mastery. He was so consummate a liar that, when taken in the fact, he could brazenly deny it. Even his wit and knowledge of the world were spoiled, and his affected gravity was touched with sadness, by the odour of falsehood which escaped through every pore of his body." In 1789 appeared "L'histoire du Cardinal Dubos," attributed to one of his secretaries; and in 1815 his Mémoires secrets et correspondance intime, edited by L. de Savignies.

DUBOS, JEAN BAPTISTE (1670-1742), an eminent French author, was born at Beauvais in December 1670. After studying for the church he renounced theology for the study of public law and politics. He was employed by M. de Tocque, minister of foreign affairs, and by the regent and Cardinal Dubois in several secret missions, in which he acquitted himself with great success. He was rewarded with a pension and several benefices. Having obtained these, he retired from political life, and devoted himself to history and literature. He gained such distinction as an author that in 1720 he was elected a member of the French Academy, of which, in 1722, he was appointed perpetual secretary in the room of M. Dacier. He died at Paris on the 28th of March 1742, at the age of seventy-two, repeating as he expired the well-known prayer of an ancient, "Holy in law, not a punish work." His first work was "L'Histoire des quatre Gardiens prouvé et illustré par des Médaillés" (Paris, 1695, 12mo), which, in spite of its ingenuity, did not succeed in altering the common opinion, which only admits three emperors of this name. About the commencement of the war of 1701, being charged with different negotiations both in Holland and in England, with the design to engage those powers if possible to adopt a pacific line of policy, he, in order to promote the objects of his mission, published a work entitled Les Intérêts de l'Angleterre mal entendus dans la Guerre présente, Amsterdam, 1703, 12mo. But as this work contained indiscreet disclosures, of which the enemy took advantage, and predictions which were not fulfilled, a wag took occasion to remark that the title ought to be read thus: Les Intérêts de l'Angleterre mal entendus par l'Able Dubos. It is remarkable as containing a distinct prophecy of the revolt of the American colonies from Great Britain. His next work was "L'Histoire de la Ligue de Cambrai" (Paris, 1709, 1728, and 1755, 3 vols 12mo), a full, clear, and interesting history, which obtained the commendation of Voltaire. In 1734 he published his "Histoire Critique de l'établissement de la Monarchie Française dans les Gaules, 3 vols 4to," a work the object of which was to prove that the Franks had entered Gaul, not as conquerors, but at the request of the nation, which, according to him, had called them in to govern it. But this system, though unfolded with a degree of skill and ability which at first procured it many zealous partisans, was vigorously refuted by Montesquieu at the end of the thirteenth book of the "Esprit des Lois." His "Récensions critiques sur la Poésie et sur la Peinture," published for the first time in 1719, 2 vols 12mo; but often reprinted in three volumes, constitutes one of the works in which the theory of the arts is explained with the utmost sagacity and discrimination. Like his history of the League of Cambrai, it was highly praised by Voltaire. The work was rendered more remarkable by the fact that its author had no practical acquaintance with any one of the arts whose principles he discussed. Besides the works above enumerated, a manifesto of Maximilian, elector of Bavaria, against the emperor Leopold, relative to the succession in Spain, has been attributed to Dubos, chiefly, it appears, from the excellence of the style.

DUBOSSARI, or NOVVE DUBOSSARI, a town of European Russia, in the government of Mogileff, 11 miles east of Orsha, on the left bank of the Dniester, 101 miles from Odessa, in 47° 16' N. lat. and 29° 9' E. long. It occupies a picturesque position, is surrounded by fertile fields and gardens, has two churches, a synagogue, and a public hospital, and contains from 7000 to 8000 inhabitants—9000 Moldavians, 1200 Jews—who are mainly dependent on the trade in the local wine and tobacco, though they also deal in timber, cattle, and grain. Dubossar was founded in keeping with the terms of the Russian peace of 1795, and received the epithet Novve, or New, to distinguish it from the old town of Dubossar (Tombasar, or Tymbashar), on the right bank of the Dniester, in Bessarabia, which had been of considerable importance under the Tartar domination.

DUBROVNA, a town of European Russia, in the government of Mogileff, 11 miles east of Orsha, on the highway to Smolensk, in 54° 34' N. lat. and 30° 41' 9" E. long. Its wooden houses are ranged for the most part along the left bank of the Dniester, and in the neighbourhood of the two streams Dubrovensk and Smuka; and among its public buildings are six orthodox churches, a Roman Catholic chapel, a synagogue, a hospital, and a Jewish high school supported by Government. The town is mentioned at a pretty early date, and frequently appears in the history of the 16th century. In 1514 it requested to be received into allegiance to Vasili Ivanovitch of Moscow; but after his defeat near Orsha it returned to Lithuania. In 1535 it was burned by Vasili Shukai;
and in 1562, 1563, and 1580 it suffered a similar fate. The population, which is predominantly Jewish, amounts to 504.

DUBUQUE, a city of the United States, capital of a county of the same name in Iowa, situated on the right bank of the Mississippi, 155 miles west of Chicago. The business portion occupies a terrace at no great heights above the river, and the rest of the city is picturesquely arranged on the bluffs below. Several of its fourteen churches, besides a so-called cathedral, are edifices of considerable pretensions; and the building erected by the United States for the custom-house, post-offices, and other Government purposes is constructed of marble. The educational institutions are the high school and a theological seminary for German Presbyterians. As a port of delivery, a railway junction, and the centre of the lead region of Iowa, Dubuque has an extensive and varied trade, and engages in a large number of manufacturing industries; of lead alone its exports amount to 20,000,000 lb. annually. The name of the city is derived from a French Canadian, who received permission from the Spanish Government to carry on mining in the vicinity, and settled on the spot in 1788. The first real settlement was in 1833; incorporation as a town was obtained in 1837, and a city charter in 1849. Population in 1860, 3108; in 1875, 25,161.

DUCANGE, CHARLES DEFFRESNE, SIGNEUR (1610–1688), a most learned historical and philological writer, was born at Amiens, December 18, 1610. His father, who was royal provost of Beauquesne, sent him at an early age to the Jesuits' College in Amiens, where he soon distinguished himself. Having completed the usual course at this seminary, he applied himself to the study of law at Orleans, and afterwards went to Paris, where he was received as advocate before the parliament in August 1631. Meeting with little success as a barrister, he returned to his native district, where he applied himself to the study of history.

After the death of his father, Ducange married at Amiens, on 19th July 1658, Catherine Du Bois, daughter of a treasurer of France; and, in 1647, he purchased the office of his father-in-law, the duties of which in no degree interfered with the great literary works in which he had engaged. The plague, which in 1668 desolated Amiens, forced him to leave that city. He established himself at Paris, where he continued to reside until his death, which occurred on the 23rd October 1688. In the archives of Paris he was enabled to consult charters, diplomas, titles, manuscripts, and a multitude of printed documents, which were not to be met with elsewhere. His industry was exemplary and unremitting; and the number of his literary works would be incredible, if the originals, all written in his own hand, were not still extant. He was distinguished above nearly all the writers of his time by his linguistic acquirements, his accurate and varied knowledge, and his critical sagacity.

Of his numerous published works noted below the most important are the Glossarium ad Scriptores medici et infusion Graecitatis, and his Glossarium ad Scriptores medici et infusion Graecitatis, which are indispensable aids to the student of the history and literature of the Middle Ages. To the three volumes of Ducange's Latin glossary three supplementary volumes were added by the Benedictines of St Maur (1733), and a further addition of four volumes was made by Carpentier, a Benedictine, in 1765. The edition published at Paris in that year accordingly consisted of ten volumes. The edition by G. A. L. Henschel (8 vols., Paris, 1846–47) includes those supplements and further additions by the editor.

Ducange published the following works—1. Histoire de l'Empire de Constantinople sous les Empereurs Francois. Paris, 1867, folio. 2. Traité Historique du Chef de S. Jean-Baptiste. Paris, 1668, 4to. 3. Histoire de S. Louis, Roi de France, écrite par Jean, sire de Joinville. Paris, 1668, folio. 4. Joanna Cunnami Historie de rebus gestis a Joanna et Manuele Commune ibn VI, Grece et Lutnia, cum Notis hactenus. Paris, 1778, folio. 5. Mémoires sur le projet d'un nouveau Recueil des Historiens de France, avec le plan général de ce Recueil, inserter in the Bibliotheca Historica de la France, by Feré Leelong. 6. Glossarium ad Scriptores medici et infusion Graecitatis. Paris, 1678, 4to. fol. 7. Lettre du Sieur N., Conseiller du Roi, a son ami M. de Boullanger, comte d'Hercouval, au sujet des Echoes qui se publiaient en Flamand contre les ER. PP. Henchenu et Pepsbroch, Jesuites. Paris, 1832, 4to. 8. Historia Byzantina duplici commentario illustrata. Paris, 1840, fol. 9. Joanna Cunnami Annales ad exercito Mandi ad mortem Alexii Commune, Grece et Lutnia, cum Notis. Paris, 1868, 2 vols. fol. 10. Glossarium ad Scriptores medici et infusion Graecitatis. Paris, 2 vols. fol. 11. Chronicon Paschalii a Mundo condito ad Heraclius Imperatoris antiquo vigesimo. Paris, 1869, fol. The last work was passing through the press when Ducange died; and, on his decease, it was edited by Balaiz, and published with an eulogy of the author prefixed. His autograph manuscripts, and his extensive and valuable library, passed to his eldest son, Philippe Deffresne, who died unmarried, four years after. François Deffresne, the second son, and two sisters, then received the succession and sold the library, which the greater part of the manuscripts was purchased by the Abbé Du Champs, who handed them over to a bookseller called Marette, who re-sold part of them to Baron Hebenstorf. The remaining part was acquired by D'Holster, the genealogist. But the French Government, aware of the importance of all the writings of Ducange, succeeded, after much trouble, in collecting the greater portion of these manuscripts, which were preserved in the library of Paris. Among these manuscripts was one entitled Gallia, a work of great erudition, being a history of France, divided into seven epochs, with a number of illustrations.

See Furet's Essai sur la vie et les ouvrages de Ducange (Paris, 1859).

DUCAS, Michael, a Greek historian who flourished under Constantine XII., about 1450. The dates of his birth and death are unknown. He belonged to the illustrious family of his name that gave several emperors to Constantinople, and he is supposed to have held a high office at the court of Constantine XII. After the fall of Constantinople, he was employed in various diplomatic missions by the princes of Lesbo, where he had taken refuge. He was successful in securing a semi-independence for Lesbo until 1462, when it was taken and annexed to Turkey by Sultan Mahomet II. It is known that Ducas survived this event, but there is no record of his subsequent life. He is the author of a history beginning with the death of John Palaeologus I., and extending as far as the capture of Lesbo in 1462. There is a preliminary chapter giving a chronology from Adam to D'Ostian, the genealogist. But the French Government, aware of the importance of all the writings of Ducange, succeeded, after much trouble, in collecting the greater portion of these manuscripts, which were preserved in the library of Paris. Among these manuscripts was one entitled Gallia, a work of great erudition, being a history of France, divided into seven epochs, with a number of illustrations.

The edition of 1640 was issued by Bullialdus at Paris in 1640 with a Latin version and notes. This edition was reprinted at Venice in 1739. The work was edited by Beckler for the Bonn series of the Byzantine historians (Bonn, 1834). A French translation was incorporated by President Comenius in his Historia de Constantinopoli (Paris, 1672). An early Italian translation, discovered by Vo Banke at Venice, is appended to the Bonn edition.

DUCHENE, ANDRÉ (Latin, DUCHENTUS or Quercus-Truncus) (1584–1640), a French geographer and historian, generally styled the father of French history, was born at Ille-Bouchard, in the province of Touraine, in May 1584. He was educated at Loudun and afterwards at Paris, where he studied under Julius Caesar Boulanger. From his earliest years he devoted himself to geographical research, and his first work, Egriquirum seu Selectarum Locionum et Antiquitatum Liber, dedicated to Boulanger, and published in his eighteenth year, displayed great erudition. He enjoyed the patronage of Cardinal Richelieu, a native of the same district with himself, through whose influence he was appointed his geographer and geographer to the king. He died in 1640, in consequence of having
and I am Council. Napoleon wished him to accept some post of honor under his own contrivance and invention; and though his sanction by their supposed kinsmanship be produced nothing more original than the old story which the author received what was secured and the failure of Watteau, and the death of Voltaire. Equally successful was the author, who had been growing Within the success of his work. Marshal Belleisle procured and genealogical histories of illustrious French families, of Juvenal, and where his father, originally from Chartier, had been run over by a Duck and his country house at France. His Lives of the French Cardinals and of the Saints of France have been published by the Rollandists, MబBILLON, and others. He published a translation of the Satires of Juvenal, and editions of the works of Abelard, Alain Chartier, and Étienne Pasquier.

DUCIS, JEAN FRANÇOIS (August 22, 1733–March 31, 1816), a French dramatic poet, famous more especially for his adaptations of Shakespeare to the Parian stage of the 18th century. He was born and brought up at Versailles, where his father, originally from Savoy, held the position of a respectable linen-draper; and all through life he retained the simple tastes and straightforward independence fostered by his bourgeois education. The friendship of Marshal Belleisle procured him an appointment as clerk, and even after he ceased to discharge the duties of his post secured the continuance of his salary. In 1768 the passion for the theatre which had been growing within him during the previous years found vent in the tragedy of Amélie, and the failure of this first attempt was fully compensated by the success of his Hamlet in 1767, and of Romeo and Juliette in 1772. Edipe chez Admeté, united partly from Euripides and partly from Sophocles, appeared in 1776, and secured him in the following year the chair in the Academy left vacant by the death of Voltaire. Equally successful was Le Ros Lorr in 1783, at the representation of which the author received what was then the rare honour of being called before the curtain. Macbeth in 1783 did not take so well, and Jean sans Peur in 1791 was almost a failure; but Oedipe in 1792, supported by the acting of Talma, obtained immense applause. The next appearance of the author was no longer as an adapter or imitator of foreign models, but as a dramatist with a plot and characters of his own contrivance and invention; and though his contrivance produced nothing more original than the old story of unlawful love between brother and sister ultimately obtaining sanction by their supposed kinship being disproved, the poetic charm of the verse and its vivid picturing of desert life secured for Abéfour, ou la famille arabe, a flattering reception. On the failure of a similar piece, Pêcher et Waldmar, ou la famille des Sibères, Ducis ceased to write for the stage; and the rest of his life was spent in quiet retirement at Versailles. He had been named a member of the Council of the Ancients in 1789, but he never discharged the functions of the office; and, when at a later date Napoleon wished him to accept some post of honour under the empire, he escaped from his solicitations by a happy brushsmere.—General, do you like wild duck shooting? I am something of a wild duck myself; and, when hunting with a beaucoc, he had little sympathy with the fierce, sceptical, and tragic times in which his lot was cast. "Abas!" he said in the midst of the Revolution, "tragedy is abroad in the streets; if I step outside of my door, I have blood to my very ankles. I have too often seen Atreus in cloaks, to venture to bring an Atreus on the stage." Though actuated by what seems to have been an honest and ardent admiration of the great English dramatist, Ducis is not in any deep sense of the word Shakespearean. His ignorance of the English language left him at the mercy of such translators as Letourneur and La Place, and even this modified Shakespeare still had to undergo a process of purification and correction before he could be presented to the fastidious criticism of French taste. That such was the case was not, however, the fault of Ducis, and his works, defective as they were, did good service in modifying the judgment of his fellow countrymen. He did not pretend to reproduce, but to excerpt and retouch, and consequently the French play sometimes differs from its English namesake in everything almost but the name. The plot is different, the characters are different, the motif different, and the scenic arrangement different. The result is really a new play, and a new play, as it is said, with undoubted merits of its own. Le banquet de Familiq, a poem in four cantos, 1771, Au Ros de Sarlatino, 1775, Discours de réception à l'académique française, 1779, Épître à l'amitié, 1786, and a Recueil de Poëmes, 1850, complete the list of Ducis's publications. An edition of his works in three volumes appeared in 1813; Oeuvres posthumes were edited by Campenon in 1826; and Hamlet, Edipe chez Admeté, Macbeth, and Atéfour are reprinted in vol. ii. of Didot's Choix d'œuvres tragiques.

See Campenon, Essais de mémoires sur Ducis, 1824, Oeuvres Lévy, Étude sur la personne et les ouvrages de Ducis, 1852, based on Ducis's own memoirs preserved in the library at Versailles; Sainte-Beuve, Oeuvres du monde, t. vi, and Nouveaux textes, t. iv; Villermain, Tableau de la litt. au XVIIIe siècle.

DUCK, a word cognate with the Dutch Duiker (Germ. Tauch-ent— and in Bavaria Duck-ent)— and in Brazilian Duck-ent, the general English name for a large number of birds forming the greater part of the Family Anatidae of modern ornithologists. Technically the term Duck is restricted to the female, the male being called Drake, and in one species Mallard (Fr. Malarit).

The Anatidae may be at once divided into six more or less well marked Subfamilies—(1) the Cypriotes or Swans, (2) the Anserinae or Geese—which are each very distinct, (3) the Anatinae or Fresh-water Ducks, (4) those commonly called Fuligulinae or Sea-Ducks, (5) the Ernematurne or Spiny-tailed Ducks, and (6) the Megapodi or Margaridae. Of the Anatinae, which may be considered the typical group, we propose to treat here only, and especially of the Anas boschas of Linnæus, the common Wild Duck, which from every point of view is by far the most important species, as it is the most plentiful, the most widely distributed, and the best known—being indeed the origin of all our domestic breeds. It inhabits the greater part of the northern hemisphere, reaching in winter so far as the Isthmus of Panama in the New World, and in the Old being abundant at the same season in Egypt and India, while in summer it ranges throughout the Four-Countries, Greenland, Iceland, Lapland, and Siberia. Most of those which fill our markets are no doubt bred in more northern climates, but a considerable proportion of them are yet produced in the British Islands, though not in anything like the numbers that used to be supplied before the draining of the great Freshwater and other marshy places. The Wild Duck pairs very early in the year—the period being somewhat delayed by hard weather, and the ceremonies of courtship, which requires some little time. Soon after these are performed, the respective couples separate in search of suitable nesting places, which are generally found, by those that remain with us, about the middle of March. The spot chosen is sometimes near

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a river or pond, but often far removed from water, and may be in a furze-bush, on a dry heath, at the bottom of a thick hedge-row, or even in any convenient hole in a tree. A little dry grass is generally collected, and on it the eggs, from 9 to 11 in number, are laid. So soon as incubation commences the mother begins to dive herself of the down which grows thickly beneath her breast-feathers, and adds it to the nest-furniture, so that the eggs are deeply imbedded in this heat-retaining substance—a portion of which she is always careful to pull, as a coverlet, over her treasures when she quits them for food. She is seldom absent from the nest, however, but once, or at most twice, a day, and then she dares not leave it until her mate has arrived. After several circling flights of observation has assured her she may do so unobserved. Joining him the pair betake themselves to some quiet spot where she may bathe and otherwise refresh herself. Then they return to the nest, and after cautiously reconnoitring the neighbourhood, she loses no time in resitting herself on her eggs, which, when she is settled, repairs again to the water, and passes his day listlessly in the company of his bretheren, who have the same duties, hopes, and cares. Short and infrequent as are the absences of the Duck when incubation begins, they become shorter and more infrequent towards its close, and for the last day or two of the 28 days necessary to develop the young it is probable that she will not stir from the nest at all. When all the fertile eggs are hatched her next care is to get the brood safely to the water. This, when the distance is great, necessarily demands great caution, and so cunningly is it done that but few persons have encountered the mother and offspring as they make the dangerous journey.1 If disturbed the young instantly hide as they best can, while the mother quacks loudly, feigns lameness, and flutters off to divert the attention of the intruder from her brood, who lie motionless at her warning notes. Once arrived at the water they are comparatively free from harm, though other perils present themselves from its inmates in the form of Pikes and other voracious fishes, which seize the Ducklings as they disport in quest of insects on the surface or dive beneath it. Throughout the summer the Duck continues her care unremittingly, until the young are full grown and feathered; but it is no part of the Mallard's duty to look after his offspring, and indeed he speedily becomes incapable of helping them, for towards the end of May he begins to undergo that remarkable deviation from the normal form of the so-called Penguin-Duck, in which the bird assumes an upright attitude and its wings are much diminished in size. A remarkable breed also is that often named (though quite fancifully) the "Buenos-Ayres" Duck, wherein the whole plumage is of a deep black, beautifully glossed or bronzed. But this saturation, so to speak, of colour only lasts in the individual for a few years, and as the birds grow older they become mottled with white, though as long as their reproductive power lasts they "breed true." The amount of variation in domestic Ducks, however, is not comparable to that found among Pigeons, no doubt from the absence of the competition which Pigeon-fanciers have so long exercised. One of the most curious effects of domestication in the Duck, however, is, that whereas the wild Mallard is not only strictly monogamous, but, as Waterton believed, a most faithful husband—remaining paired for life, the civilized Drake is notoriously polygamous.

Very nearly allied to the common Wild Duck are considerable number of species found in various parts of the world in which there is little difference of plumage between the sexes—both being of a dusky hue—such as Anas obscura of North America, A. superciliosa of Australia, A. pacificus of India, A. melier of Madagascar, A. zanzibarica of South Africa, and some others. It would be impossible here to enter upon the other genera of Anatidae. We must content ourselves by saying that both in Europe and in North America there are the groups represented by the Shoveller, Garganey, Gadwall, Teal, Pintail, and Widgeon—each of which, according to some systematists, is the type of a distinct genus. Then there is the group Anas with its beautiful representatives the Wood-Duck (A. sponsa) in America and the Mandarin-Duck (A. galericulata) in Eastern Asia. Besides there are the Sheldrakes (Tadorna), confined to the Old World and remarkably developed in the Australian Region; the Musk-Duck (Claria) of South America, which is often domesticated and in that condition will produce fertile hybrids with the common Duck; and finally the Tree-Ducks (Denrocygna), which are almost limited to the Tropics. (A. W.)

Duckworth, Sir John Thomas (1748-1817), admiral, was born at Leatherhead, in Surrey, on the 28th February 1748. He entered the navy in 1759, and obtained his commission as lieutenant in June 1770, when he was appointed to the "Princess Royal," the flagship of Admiral Byron, in which he sailed to the West Indies. While serving on board this vessel he took part in the engagement with the French fleet under Count D'Estaing. In July 1779 he became commander, and was appointed to the "Rover" sloop; in June of the following year he attained the rank of post-captain. Soon afterwards he returned to England in charge of a convoy. The outbreak of the war with France gave him his first opportunity of obtaining marked distinction. Appointed first to the "Orion" and then to the "Queen" in the Channel Fleet, under the command of Lord Howe, he took part in the three days' naval engagement with the Brest fleet, which terminated in a glorious victory on the 1st June 1794. For his conduct on this occasion he received a gold medal and the thanks of Parliament. He next proceeded to the West Indies, where he was stationed for some time at St Domingo. In 1798 he commanded the "Leviathan" in the Mediterranean, and had charge of the naval detachment which, in conjunction with a military force, captured Minorca. Early in 1799 he was raised to the rank of rear-admiral, and sent to the West Indies to succeed Lord Hugh Seymour. During the voyage out he captured the Spanish convoy of eleven merchants. In March 1801 he was the naval commander of the combined force which reduced the islands of St Bartholomew and St Martin, a

1 When Ducks breed in trees, the precise way in which the young get to the ground is still a matter of uncertainty. The mother is supposed to carry them in her bill, and most likely does so, but further observation on this point is required.
service for which he was rewarded with the order of the Bath and a pension of £1000 a year. Promoted to be vice-admiral of the blue, he was appointed in 1804 to the Jamaica station. Two years later, while cruising off Cudiz with Lord Collingwood, he was detached with his squadron to pursue a French fleet that had been sent to the relief of St Domingo. He came up with the enemy on the 6th February 1806, and, after two hours’ fighting, inflicted a signal defeat upon them, capturing three of their five vessels and stranding the other two. For this, the most distinguished service of his life, he received the thanks of the Jamaica Assembly, with a sword of the value of a thousand guineas, the thanks of the English Parliament, and the freedom of the city of London. In 1807 he was again sent to the Mediterranean to watch the movements of the Turks. In command of the “Royal George” he forced the passage of the Dardanelles, but sustained considerable loss in effecting his return, the Turks having strengthened their position. He held the command of the Newfoundland fleet for four years from 1810, and at the close of that period he was made a baronet. In 1815 he was appointed to the chief command at Plymouth, which he held until his death on the 14th April 1817. Sir John Duckworth sat in Parliament for some time as member for New Romney.

DUCLOS, CHARLES PIRAU (1704—1772), a French author, was born at Dinant, in Brittany, in 1704. At an early age he was sent to study at Paris. After some time spent in dissipation he began to cultivate the society of the wits of the time, and became a member of that club or association of young men who published their joint efforts in light literature under the titles of Recueil de ces Membres, Élèves de la St Jean, (Élue de Pères, etc.). His romance of Acapou and Zarphile, which was composed after a series of plates which had been engraved for another work, was one of the fruits of this association, and was produced in consequence of a sort of wager amongst its members. Duclos had previously written two other romances which were more favourably received—The Baroness of Luc, and the Confessions of the Count de ***. His first serious publication was the History of Louis XI, which is dry and epigrammatical in style, but displays considerable powers of research and impartiality. The reputation of Duclos as an author was confirmed by the publication of his Considérations sur la Manue, a work which is much and justly praised by Laharpe, as containing a great deal of sound and ingenious reflection. It was translated into English and German. The Mémoires pour servir à l’Histoire du dix-huitième Siècle, which were intended by the author as a sort of sequel to the preceding work, are nevertheless much inferior in respect of both style and matter, and are, in reality, little better than a kind of romance. In consequence of his History of Louis XI, he was appointed historiographer of France, when that place became vacant on Voltaire’s retirement to Prussia. His Secret Memoirs of the reign of Louis XIV, and Louis XV, and his Considerations on Italy, were not published until after the Revolution. The former work is highly spoken of by Chamfort. Duclos became a member of the Academy of Inscriptions in 1739, and of the French Academy in 1747. Of the latter he was appointed perpetual secretary in 1755. Both academies were indebted to him not only for many valuable contributions, but also for several useful regulations and improvements. As a member of the Academy of Inscriptions, he composed several memoirs on the Druids, on the origin and revolutions of the Celtic and French languages, on trial by battle and proof by ordeal, and on scenic representations and the ancient drama. As a member of the French Academy, he assisted in compiling the new edition of the Dictionnaire, which was published in 1762; and he made some just and philosophical remarks on the Port Royal Grammar. On several occasions he distinguished himself by vindicating the honour and prerogatives of the societies to which he belonged, and the dignity of the literary character in general. He used to say of himself, “I shall leave behind me a name dear to literary men.” The citizens of Dinant, whose interests he always hotly defended with zeal, appointed him mayor of their town in 1744, though he was resident at Paris. He was afterwards elected deputy from the commons to the assembly of the states of Brittany, and upon the requisition of this body the king granted him letters of nobility. In 1766 he was advised to retire from France for some time, having rendered himself obnoxious to the Government by the opinions he had expressed on the dispute between the Duc d’Aiguillon and M. de la Chaibiats, the friend and countryman of Duclos. Accordingly he set out for Italy; and on his return he wrote an account of his travels, which is also praised by Chamfort. He died at Paris, March 26, 1772, in the sixty-ninth year of his age. The character of Duclos was singular in its union of impertinence and prudence. Rousseau described him very laconically as a man droit et adroit. In his manners he displayed a sort of bluntness in society, which frequently rendered him disagreeable, and his caustic wit on many occasions created enemies. To those who knew him, however, he was a pleasant companion. A considerable number of his bos mots have been preserved by his biographers. A complete edition of the works of Duclos, including an unfinished autobiography, was published by Desessart, at Paris, in 10 vols. 8vo, 1806.

DUDEVANT, ARMBINTTE LUCILE AUBRE (1804—1876), known to all the world as the second, if not the greatest, of French novelists, by her assumed name of George Sand, was born at Paris 5th July 1804, and died 8th June 1876. Her life is as fantastic and eventful as any of her fictions, and the main secret of her success has been her power to clothe in artistic form her varied experiences of men and places.

It is no easy task to set down in a short space the outward events of her life, and to trace the development of her genius, not only because of the abundance of materials she has left behind her, but still more from the subtle way in which she has interwoven fact and fiction. In the History of her Life, which covers half a century, the omissions are no less surprising than the revelations, and though she never indulges in the self-illusions of Dichtung und Wahrheit, which perplex or muddle the biographers of Goethe, yet she wisely refuses to satisfy the curiosity of the public on the most delicate episodes of her life. If, to fill up the blanks, we turn to her novels, George Sand justly warns us that in trying to raise the mask and identify her with any one of her characters, we shall not only lose our pains, but show that we mistake the fundamental conditions of art. Yet by the help of critics to supply the missing clue (and no writer of this century has so provoked criticism), it is possible to decipher the chief lines of the most remarkable woman of this age, and the greatest authoress in the world’s history.

Aurore was the daughter of Lieutenant Dupin and of his newly-married mistress Sophie Delaborde, the daughter of a Paris bird-fancier. Her paternal grandfather was M. Dupin de Franceuil, a farmer-general of the revenue, who had married Mlle. Rinteau, widow of Count Horn (a natural son of Louis XV.), and natural daughter of Marshal Saxe, the most famous of the many illegitimate children of Augustus the Strong by the lovely counteress of Kongsmark. This strange pedigree has been traced in detail by George Sand, and she recognizes it as one of the elements which went to mould her character. She boasts of the royal blood which she inherited through her father, and, disregarding the bar sinister, claims relationship with Charles X.
and Louis XVIII., and she proclaims herself as frankly a daughter of the people, endued by nature with the instincts of her class. Her birth itself was romantic. Her father was playing a country dance at the house of a fellow officer, the future husband of Sophie's sister, when he was told that his wife, who had not long left the room, had borne him a daughter. "She will be fortunate," said the aunt, so she was borne among the roses to the sound of music."

Passing by her infantile recollections, which go back further than even those of Dickens, we find her at the age of three crossing the Pyrenees to join her father who was on Murat's staff, occupying with her parents a suite of rooms in the royal palace, adopted as the child of the regiment, nursed by rough old sergeants, and dressed in a complete suit of uniform to please the general.

For the next ten years she lived at Nohant, near Le Châtre in Berry, the country house of her grandmother. Here her character was shaped, and she was one of the child's affection, and the struggle between the mother and grandmother was one of the bitterest of Aurore's childish troubles.

Next to the grandmother, the most important person in the household at Nohant was Deschatre. He was an ex-abbé who had shown his devotion to his mistress when her life was threatened, and henceforward was installed at Nohant as factotum. He was maire of the village, he managed the estate, doctored the neighbourhood, played piquet with Madame, was tutor to Aurore's half-brother, and, in addition to his other duties, undertook the education of the girl. The tutor was a more sugar to the taste that satisfied the love of country scenes and country life which neither absence, politics, nor dissipation could uproot; here she learnt to understand the ways and thoughts of the peasants, and laid up that rich store of scenes and characters which a marvellously retentive memory enabled her to draw upon at will. The progress of her mind during these early years well deserves to be recorded. Education, in the strict sense of the word, she had none. A few months after her return from Spain her father was killed by a fall from his horse. He was a man of remarkable literary gifts as well as a good soldier, and his letters, which are included in her life, show in a less degree the vivid force of description and clear insight into character which he bequeathed to his daughter. "Character," says George Sand, "is in a great measure hereditary: if my readers wish to know me they must know my father." On his death the mother resigned, though not without a struggle, the care of Aurore to her grandmother, Mme. Dupin de Francueil, a good and wise old woman who, though not in a fit of home-sickness, found herself one evening in the convent chapel. In a strange reverie she sat through vespers. Time passed unnoticed, the prayers were over, the chapel was being closed.

"I had forgotten all; I knew not what was passing in me; with my soul rather than my senses, I breathed an air of ineffable sweetness. All at once a sudden shock passed through my body, my eyes swam, and I seemed wrapped in a dædal white mist. I heard a voice murmur in my ear: 'Pâles, ma maîtresse ...' I turned round thinking that it was one of the sisters talking to me—I was alone. I indulged in vain illusion; I believed in no miracle; it was not sensible of the sort of hallucination into which I had fallen; I neither sought to intensify nor to escape from it. Only I felt that faith was laying hold of me—by the heart, as I have said, but not, as I then supposed, by the head. With gratitude and joy that the tears rolled down my cheeks. I felt as if nature and instinct had embraced and accepted that ideal of justice, tenderness, and holiness which I had never doubted, but with which I had never held direct communion, and now at last I felt that the communion was consummated, as though an invincible barrier had been broken down between the source of infinite light and the smiling fire of my heart. An endless vista stretched before me, and I longed to start upon my way. There was no more doubt or inexperience. That I should repent on the morrow and rally myself to my over-wrought existence never once entered my thoughts. I was like one who never casts a look behind, who hesitates before some Rubicon to be crossed, but having touched the further bank sees no more the shores he has just left."

Such is the story of her conversion as told by herself. It reads more like a chapter from the life of Sts Thérèse and Madame Guyon than of the author of Lélia. Yet no one can doubt the sincerity of her narrative, or even the permanence of her religious feelings under all her many phases of faith and aberrations of conduct. A recent critic has sought in religion the secret of the charm of her character and the plasticity of her genius. But, except we take religion in the vague sense of the vision and the faculty divine, this is a one-sided view. "Half poet and half mystic" is the verdict she pronounces on herself, and we may add that her element of mysticism was always subordinate to the poetic.

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Again in 1830 Aurore exchanged the restraint of a convent for freedom, being recalled to Nohant by Mme. de Francueil, who had no intention of letting her granddaughter grow up a dévote. She rode across country with her brother, she went out shooting with Deschatre, she sat by the cottage doors on the long summer evenings and heard the flax-dressers tell their tales of witches and warlocks. She read widely though unsystematically Aristotle, Leibnitz, Locke, Condillac, and fed her imagination with René and Childe Harold. Her confessor lent her the De Imitatione for all the world, she took it. "I breathed an all' of the convent chapeL In a strange reverie she sat through vespers. Time passed unnoticed, the prayers were over, the chapel was being closed.

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of inclination, and the first years of her married life, during which her son and daughter, Maurice and Solange, were born, were at least calm and peaceful. Soon differences arose. Her husband seems to have been neither better nor worse than the Berroche squires around him, but she found herself mated, as to a clown, yet to a belles lettres whose heart was in his farm and cattle. After nine years of passive endurance she determined to put an end to a connection which had grown intolerable, and in 1831 an amicable separation was agreed upon. Nohant was surrendered to the husband, and, taking her daughter with her, she went to seek her fortune in Paris with no provision but an allowance of £60 a year. After vain attempts to support herself by some of those expedients to which her Bon and daughter, but an allowance of fifteen francs. But there neither rendered to the law student already known to her Ftqaro, and, was a college student, and made the acquaintance of the whole living was the beginning of an raw material was woven by the quiet beauty and pastoral melancholy of the Vallée Noire and the banks of the Indre. Her Bohemian life at Paris—her vie de gamme, as she calls it—in which she adopted not only the dress but the life of a college student, and made the acquaintance of the whole Paris world between the artist and the artisan, is sketched by her in an allegory which is worth quoting if only as a specimen of the simple perfection of her style.

"I care little about growing old, I care far more not to grow old alone, but I have never met the being with whom I could have died, or if I ever met him I knew not how to keep him fast to a story and weep. There was a good artist called Watteau, the best aquafortiste engraver of his day. He loved beauty, and it was his work to engrave as well as himself. She left husband and home to go and live with him. The world condemned them, then, as they were poor and modest, but they forgave each other. Five years afterwards their retrial was discovered. In a convent in the environs of Paris called le Mont St. Denis, there sat at the same table an old man engraving and an old woman whom he called his muse and also engraving. The last design they were at work upon represented the Moulin St. Denis, the house of Marguerite, with the device: 'Un valle perversum Salva divina operatus' (It hangs in my room over a portrait of the original of which no one else has seen). For a year the person who gave me this portrait sat with me every night at a little table and lived by the same work. At daybreak we consulted together on our work for the day, and at night we supped at the same little table, chatting the whole on art, and even on marriage. The future broke faith with us. Pray for me, O Marguerite Lecomte!"

Her third novel, Lëtie, marks the climax of her rebellion against society. It was written in a fit of deep depression, religious and political, and as a wild dêbâcle, the passionate wail of a woman whose affections have been blighted, and whose jaundiced eyes see nothing but a lifeless, loveless, godless world. But like Goethe in his Werther she "hid her bosom of that perilous stuff," and, though once and again she inveighed against society, she never more lost faith in the moral government of the world.

Of her unfortunate relations with A. de Musset, and her voyage to Italy in his company, which followed the publication of Lëtie, nothing need be said except as they affected her literary career. As the motives of Indiana and Valentine are an unhappy marriage, so the novels of the period (1833-1835), Jacques, André, and Leonce Leon, are the outcome of an unhappy liaison. Her creed, the opposite of Shakespeare's, is, that love must alter as it alteration finds, and that no ties are binding but the mutual passion of the hour. Lëtie et lui is a woman's version of the quarrel between a man and woman, and if true it ought never to have been told. The moral of the tale is worth giving in George Sand's own words, "God makes certain men of genius to wander in the tempest and to create in pain. I studied you in your light and in your darkness, and know that you are not to be weighed in the balance like other men." The measure she here metes to De Musset we may fairly measure to her again.

To this Italian journey we owe some of her most charming pictures of scenery. Venice was the only town she loved for itself, and it exercised over her the same fascination as over Byron, Shelley, and Goethe. The opening scenes of Consuelo are worthy to take rank with "Othway, Radvilfe, Schiller, Shakespeare's Art," with the 4th canto of Childe Harold, Shelley's Lyric, and Goethe's Venetian Epigrams. The Lettres d'un voyageur mark the calm which succeeded the Sturm und Drang period. They are specially valuable to the student of George Sand, as they give her views of men and things, not extracted and distorted by the exigencies of a novel. In Michel de Bourges (the "Edmond" of the letter) is made the acquaintance of another of those celebrated men who influenced for a time her life and writings. He conducted the suit which ended in a judicial separation from her husband (1835), and sought to convert her to the extreme republicanism of which he was the foremost advocate and defender. Thus Lovelace of politics laid siege to her intellect as persistently as Richardson's hero (for nine mortal hours he declaimed to her, pacing to and fro before her hotel at Bourges, and at Paris he locked her into her own room that she might reflect at leisure on his suit), but though she coquetted with his communist theories, her artist nature rebelled against his extravagant radicalism. She sought safety in flight, but Manprat, which she published this year, bears marks of his influence. The Lettres à Maria, of 1837, are a tribute to the broad and noble Catholicism of Lamartine, and an eloquent expression of the doctrine of Christian hope. In Spiritualism (1838) she returns to her proper creed, a philosophical theism founded on sentiment and unfettered by dogma. Consuelo (1844) and Luigiari Fioriani (1847) were inspired by Chopin, whose declining health she tended for many years with motherly care.

La Compagnie du Tour de France (1840) and Le mensuel
In conclusion, a few words must be said of her style, though much of its delicate charm escapes foreign critics, for it is by her style that she will chiefly live. It is simple and unaffected, yet full of subtle turns and picturesque expressions. Her dialogue is sparkling, her narrative clear and flowing, her descriptions exact, and her eloquence grandiose yet never meretricious. Topin is reminded of the language of Rousseau, with something more of ease and fineness, the grace of Bernard St. Pierre, without his over-refinement, the warmth and eloquence of our greatest orators, and that without effort or strainning.” Niard pronounced George Sand the master of French prose writing. To Thackeray her diction recalled the sound of country bells falling softly and softly on the ear; it stirred the nerves of Mill like a symphony of Haydn or Mozart.

One of the greatest of English novelists seems by the name she has adopted to provoke comparison with George Sand. Psychological analysis and insight into the problems of modern life, she is at least her equal; in her range of knowledge, in self-control, and in practical common sense she is greatly her superior; but in unity of design, in harmony of treatment, in that purity and simplicity of language so felicitous and yet so unstudied, in all those qualities which make the best of George Sand’s novels masterpieces of art, she is as much her inferior. Eliot is a great moralist, a great teacher; George Sand, whatever we may think of her doctrine and her morality, is by universal consent a supreme artist.

She has stayed in many camps, and lent her pen to many causes, she has had many friends and many lovers, but to one cause only has she remained constant—the cause of human progress; and the only master in whose service she has never wearied is art.

(p. a.)

DUDLEY, a parliamentary and municipal borough of England, in a detached portion of the county of Worcestershire surrounded by the county of Stafford. It lies in the centre of the “Black Country,” about eight miles W.N.W. of Birmingham, at a junction on the Great Western railway. The town is generally well-built, its streets are well-paved, and there is a fair supply of water. The principal buildings are the parish church of St. Thomas, rebuilt in 1819 at a cost of £25,000, and restored in 1863, several old churches, of which the most recent is St. Luke’s, erected in 1876; the town-hall, the county court, the Guest hospital (formerly the blind asylum), endowed (1868) by Joseph Guest, with a legacy of £20,000 (1861), the school of art, the new dispensary (1866), and the mechanics’ institute (1861). Among the educational establishments are a free grammar-school, a subscription library, and a geological society with a small scientific museum. On a hill to the north are the extensive remains of an ancient castle, surrounded by beautiful grounds; and in the market-place stands a fountain, erected by the Earl of Dudley at a cost of £3000, on the occasion of his marriage. The manufacture of coal, iron-ore, and limestone gives its peculiar character to the industries of the place. According to the census of 1871, 5442 men were engaged in the iron manufacture, 1040 as makers of engines or machines, and 3501 in the coal-mines; while the nail manufacture along gave employment to 1267 males and 3019 females. Among the various articles produced are fire-irons, stoves, shovelers, edge tools, chains, anchors, and especially anvils and vice. The glass-works, brass foundries, and brickworks are also of importance; and tanning, brewing, and malting are extensively carried on. The parliamentary borough has an area of 7718 acres, and returns one member to Parliament. In 1871 the population of the municipal borough, which has an area of 3680 acres, was 43,782; that of the parliamentary borough was 82,249.
DUDLEY, EARLS OF, see NORTHUMBRELAND.

DUEL, a deadly combat between two persons. The word duel is used in two distinct senses—(1) the judicial combat, a form of trial which prevailed in the Middle Ages, ordained by law as a proof of guilt or innocence, and (2) the modern duel, a pre-arranged combat with deadly weapons between two private persons to settle some private quarrel.

Though dueling is in England obsolete, and in other countries fast obsolescent, yet it must still command our attention as the latest survival of feudalism, and its history will always be studied as one of the most curious developments of mediæval society.

On the origin of the duel a vast amount of perverse ingenuity has been spent. Writers of the 16th and 17th centuries commonly began their treatises with an account of the combats between David and Goliah, Hector and Achilles, the Horatii and Curatii. By etymology it is true that duelium is the same word as belium, and in this sense the origin of the duel must be traced to the earliest condition of society, when every man's hand was against his neighbour. But, in the specialized sense which the word now bears, the duel was a peculiar institution of comparatively recent origin, a local custom which never spread beyond the limits of civilized Europe. It is easily distinguished both from the casual affrays of savages and the set battles of the champions of contending nations. An account of the judicial duel will clearly show that it is the direct parent of the modern duel. In the year 501 Gondebalch, king of the Burgundians, passed a law authorizing the wager of battle, and in the preamble he gives his reason for introducing this new form of trial. It is that his subjects may no longer take oaths upon uncertain matters, or forswear themselves upon certain. Here is one proof among many that the judicial duel was introduced to correct the abuses of compurgation by oath. Like the other ordeals, such as the cross, the corned, and the oath on the gospels, were in the hands of the clergy, and were manipulated by them in the interest of the church or of themselves. In the wager of battle each man felt that his cause was in his own hands, and, though might was right, yet even this was better than the business of priests. Nor, as Montesquieu has pointed out, was the trial so irrational as it would seem to modern eyes. Among a warlike people cowardice is a sign of other vices, vices which are most hateful and most prejudicial to a simple community, of meanness, lying, and fraud. It shows an indiscour to public opinion, a neglect of the education of the day, which consisted mainly in the use of arms and warlike exercises. In a war, the law was neither better nor worse than the received morality of the time. From this jurisdiction none was exempt; women, minors, and ecclesiastics were required to appear by proxy, and adverse witnesses, and even the judge himself, were liable to be challenged and must give their words by force of arms. Those who are curious to observe the formalities and legal rules of a judicial combat find them described at length in the 28th book of Montesquieu's Esprit des Lois. On these regulations he well remarks that, as there are an infinity of wise things conducted in a very foolish manner, so there are some foolish things conducted in a very wise manner. For our present purpose it is sufficient to observe the development of the idea of personal honour from which the modern duel directly sprang. In the ancient laws of the Swedes we find that if any man shall say to another, "You are not a man equal to other men," or "You have not the heart of a man," and the other shall reply, "I am a man as good as you," they shall meet on the highway, and then follow the legal regulations for the combat. What is this but the modern challenge? By the law of the Lombards if one man call another arga, the insulted party might defy the other to mortal combat. What is arga but the dammer Junger of the German student? Beaumanoir thus describes a legal process under Louis le Debonnare. —The appellant begins by a declaration before the judge that the appellant and the defendant are the parties to a certain crime; if the appelless answers that he accuses the judge, the judge then ordains the duel. Is this not the modern point of honour, by which to be given the lie is an insult which can only be wiped out by blood?

From Germany the trial by judicial combat rapidly spread to every country of Europe. In France it was first confined to criminal cases, but this restriction was removed by Louis IX., who made it legal in civil matters as well, with the one proviso that in cases of debt the amount must exceed twelve deniers. By Philippe le Bel it was again confined in civil cases to questions of disputed inheritance, and forbidden altogether during the war between England and France. In 1385 a duel was fought, the result of which was so preposterous that even the most superstitious began to lose faith in the efficacy of such a judgment of God. A certain Jacques Legren was accused by the wife of Jean Carrouge of having introduced himself by night in the guise of her husband, and thus abused her. A duel was ordained by the Parliament, which was fought in the presence of Charles VI. Legren was defeated and hanged on the spot. Not long after a criminal arrested for some other offence confessed himself to be the author of the outrage. No institution could long survive so open a confutation. Henceforward the duel in France ceases to be an appeal to Heaven, and becomes merely a satisfaction of wounded honour. The last instance of a duel authorized by the magistrates, and conducted according to the forms of law, was the famous one between François de Vivonne de la Châtaignerie and Guy Chabot de Jarnac. The duel was fought on the 10th of July 1447 in the court-yard of the château of St Germain-en-Laye, in the presence of the king and a large assembly of courtiers. It was memorable in two ways. It enriched the French language with a new phrase; a sly and unforeseen blow, such as that by which De Jarnac worsted La Châtaignerie has since been called a coup de Jarnac. And Henry, grewed at the death of his favourite, swore a solemn oath that he would never again permit a duel to be fought. This led to the first of the many royal edicts against duelling.

In England, it is now generally agreed that the wager of battle did not exist before the time of the Norman Conquest. Some previous examples have been adduced, but
on examination they will be seen to belong rather to the class of single combats between the champions of two opposing armies. One such instance is worth quoting as a cæsum illustrative of the supererogation of the time. It occurs in a rare tract printed in London, 1610, The Duelio, or Single Combat. "Danish rumpus and the bad aspect of Mars having breached the common mother earth with her sonner’s blood streams, under the reigne of Edmund, a Saxon monarch, missioen compendium (so worthy Camden expresseth it) ballo utriusque gentía fata Edunmundo Anglorum et Canuto Danorum regibus commissum fuerunt, quis anguuli certaminis de summa imperij in hac insula (that is, the Eight in Glosstershire deponerunt.) By the laws of William the Conqueror the trial by battle was only compulsory when the opposite parties were both Normans, in other cases it was optional. As the two nations were gradually merged into one, this form of trial spread, and until the reign of Henry II. it was the only mode for determining a suit for the recovery of land. The method of procedure is admirably described by Shakespeare in the opening scene in Richard II., where Henry Bolingbroke, duke of Hereford, challenges Thomas duke of Norfolk, and in the mock-heroic battle between Horner the Armourer and his man Peter in Henry VI., and by Sir W. Scott in the Fair Maid of Perth, where Henry Gow appears before the king as the champion of Magdalen Frondoute. The judicial duel never took root in England as it did in France. In civil suits it was superseded by the grand assize of Henry II., and in cases of felony by indictment at the prosecution of the Crown. One of the latest instances occurred in the reign of Elizabeth, 1571, when the lists were actually prepared and the justices of the common pleas appeared at Tonthill Fields as uumphires of the combat. Fortunately the petitioner failed to put in an appearance, and was consequently nonsuited (See Spelman, Glossary, s.v. "Campus"). As late as 1817 Lord Ellenborough, in the case of Thornton v. Ashford, pronounced that the general law of the land is that there shall be a trial by battle in cases of appeal unless the party brings himself within some of the exceptions. Thornton was accused of murdering Mary Ashford, and claimed his right to challenge the appellant, the brother of the murdered girl, to wage of battle. His suit was allowed, and, the challenge being refused, the accused escaped. Next year the law was abolished (59 Geo. III., c. 46).

In sketching the history of the judicial combat we have traced the parentage of the modern duel. Strip the former of its legality, and divest it of its religious sanction, and the latter remains. We are justified, then, in dating the commencement of duelling from the abolition of the wager of battle. To pursue its history we must return to France, the country where it first arose, and the soil on which it has most flourished. The causes which made it indigenous to France are sufficiently explained by the condition of society and the national character. As Cunkle has pointed out, duelling is a special development of chivalry, and chivalry is one of the phases of the protective spirit which was predominant in France up to the time of the Revolution. Add to this the keen sense of personal honour, the susceptibility, and the pugnacity which distinguish the French race. Montaigne, when touching on this subject in his essays, says, "Put three Frenchmen together on the plains of Libya, and they will not be a month in company without scratching one another’s eyes out." The title chapter of Audigier’s Ancien usage des duels is headed, "Pourquoi les seuls Français se battent en duel." English literature abounds with allusions to this characteristic of the French nation. Lord Herbert of Cherbury, who was ambassador at the court of Louis XIII., says, "There is scarce a Frenchman worth looking on who has not killed his man in a duel." Ben Jonson, in his Magnetic Lady, makes Compass, the scholar and soldier, thus describe France, "that garden of humanity" —

There every gentleman professing arms
Thanks he is bound in honour to embrace
The bearing of another.
Without or questioning the cause or asking
Least colour of a reason.

Duels were not common before the 16th century. Hallam attributes their prevalence to the barbarous custom of wearing swords as a part of domestic dress, a fashion which was not introduced till the later part of the 15th century. In 1560 the states-general at Orleans supplicated Charles IX. to put a stop to duelling. Hence the famous ordinance of 1566, drawn up by the Chancelleur de l’Hopital, which served as the basis of the successive ordinances of the following kings. Under the frivolous and sanguinary reign of Henry III., "who was as eager for excitement as a woman," the rage for duels spread till it became almost an epidemic. In 1602 the combined remonstrances of the church and the magistrates extorted from the king an edict condemning to death whoever should give or accept a challenge or act as second. But public opinion was revolted by such rigour, and the statute remained a dead letter. A duel forms a fit conclusion to the reign. A hair-brained youth named L’Estoile Mariavoix swore that he would not survive his beloved king, and threw his carpet into the air. It was at once picked up, and Mariavoix soon obtained the death he had courted. Henry IV. began his reign by an edict against duels, but he was known in private to favour them; and, when De Cresqui asked leave to fight Don Philip of Savoy, he is reported to have said, "Go, and if I were not a king I would be your second."

Fontenay-Maruell says, in his Mémories, that in the eight years between 1601 and 1609, 2000 men of noble birth fell in duels. In 1609 a more effective measure was taken at the instance of Sully by the establishment of a court of honour. The edict decrees that all aggrieved persons shall address themselves to the king, either directly or through the medium of the constables, marshals, &c.; that the king shall decide, whether, if an accommodation could not be effected, permission to fight should be given; that the aggressor, if pronounced guilty, shall in any case be suspended from any public office or employment, and be mulcted of one-third of his revenue till he has satisfied the aggrieved party; that any one giving or receiving a challenge shall forfeit all right of reparation and all his offices; that any one who kills his adversary in an unauthorized duel shall suffer death without burial, and his children shall be reduced to villanage; that seconds, if they take part in a duel, shall suffer death, if not, shall be degraded from the profession of arms. This edict has been pronounced by Henri Martin "the wisest decree of the ancient monarchy on a matter which involves so many delicate and profound questions of morals, politics, and religion touching civil rights" (Histoire de France, x. 466).

In the succeeding reign the mania for duels revived. De Houssaye tells us that in Paris when friends met the first question was, "Who fought yesterday? Who is to fight to-day?" They fought by night and day, by moonlight and by torch-light, in the public streets and squares. A hasty word, a misconceived gesture, a question about the colour of a riband or an embroidered letter, such were the commonest pretexts for a duel. The slightest and most frivolous the dispute, the less were they inclined to submit them to the king for adjudication. Often, like gladiators or prize-fighters, they fought for the pure love of fighting. A misunderstanding is cleared up on the ground. "N’im­porte," cry the principals, "puisqu’aucuns sommes ici, battous-ous." Secondis, as Montaigne tells us, are no
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longer witnessed, but must take part themselves unless they would be thought wanting in affection or courage; and he goes on to complain that men are no longer contented with a single second, "c'était anciennement des duels, ce sont à cette heure des rencontres et des bains. There is no more striking instance of Richepanse's firmness and power as a statesman than his conduct in the matter of duelling. In his Testament Politique he has assigned his reasons for disapproving it as a statesman and ecclesiastic. But this disapproval was turned to active detestation by a private cause. His elder brother, the head of the house, had fallen in a duel stabbed to the heart by an enemy of the cardinal. Already four edicts had been published under Louis XIII. with little or no effect, when in 1626 there was published a fifth edict condemning to death any one who had killed his adversary in a duel, or had been found guilty of sending a challenge a second time. Banishment and partial confiscation of goods were awarded for lesser offences. But this edict differed from preceding ones not so much in its severity as in the fact that it was the first which was actually enforced. The edict was thus enforced by imposing the penalties of banishment and fines, but, these proving ineffectual to stay the evil, he determined to make a terrible example. To quote his own words to the king, "Il s'agit de couper la gorge aux duel ex aux c Nice de votre Majesté." The count de Bottleville, a renommist who had already been engaged in twenty-one affairs of honour, deter-
mained out of pure bravado to fight a twenty-second time. The duel took place at mid-day on the Place Royal. De Bottleville was arrested with his second, the count de Chopelle, they were tried by Parliament, condemned, and, in spite of all the influence of the powerful house of Montmorency, of which De Bottleville was a branch, they were both beheaded at Grève, June 21, 1627. For a short time the ardour of duellists was cooled. But the lesson soon lost its effect. Only five years later we read in the Mercure de France that two gentlemen who had killed one another in a duel were, by the cardinal's orders, hanged on a gallows, stripped, and with their heads downwards, in the sight of all the people. This was a move in the right direction, since, for fashionable wits, ridicule and ignominy is a more drastic remedy than death. It was on this principle that Caracoil, prince of Molf, when viceroy of Piedmont, finding that his officers were being devaluated by duelling, proclaimed that all duels should be fought on the parapet of the Fonte Vecchio, and if one of the combatants chanced to fall into the river he should on no account be pulled out. Under the long reign of Louis XIV. many celebrated duels took place, of which the most remarkable were that between the duke of Guise and Count Coligny, the last fought on the Place Royal, and that between the dukes of Beaufort and Nemours, each attended by four friends. Of the ten combatants, Nemours and two others were killed on the spot, and none escaped without some wound. No less than eleven edicts against duelling were issued under le Grand Monarque. That of 1643 established a supreme court of honour composed of the marshals of France; but the most famous was that of 1672, which confirmed the enactments of his predecessors, Henry IV. and Louis XII. At the same time a solemn agreement was entered into by the principal nobility that they would never engage in a duel on any pretence whatever. A medal was struck to commemorate this occasion, and the firmness of the king, in refusing pardon to all offenders, contributed more to restrain this scourge of society than all the efforts of his predecessors.

The subsequent history of duelling in France may be summarized as follows. The two great Frenchmen whose writings precluded the French Revolution both set their faces against it. Voltaire had indeed, as a young man, in obedience to the dictates of society, once sought satisfaction from a nobleman for a brutal insult, and had reflected on his temerity in the solitude of the Bastille. Henceforward he inveighed against the practice, not only for its absurdity, but also for its aristocratic exclusiveness. Rousseau had said of duelling, "It is not an institution of honour, but a horrible and barbarous custom, which a courageous man despises and a good man abhors." Then came the Revolution, which levelled at a blow the huge structure of feudalism, and with it the duel, its instrument and favourite Pasca tamen sibiacerit prince vestigia fresulis. With this reaction against the revolutionary spirit and return to feudal ideas the duel reappears. Under the Directory it again became fashionable among the upper classes. Napoleon was a sworn foe to it. "Bon dueliste maurus solidat" is one of his best known sayings, and, when the king of Sweden sent him a challenge, he replied that he would order a fencing-master to attend him as plenipotentiary. After the battle of Waterloo duels such as Ney loves to depict were frequent between disbanded French officers and officers of the allies in occupation. The restoration of the Bourbons brought with it a fresh crop of duels. Since then they have been chiefly confined to military circles, and a small section of Parisian journalists. Yet a list of duels fought within the last fifty years in France would occupy no inconsiderable space, and would include some of the most famous names, in literature and politics, Émile de Girardin, Armand Carrel, Lamartine, Alexandre Dumas, Ledru Rollin, Edmond About, Sainte-Beuve, and M. Thiers. Even at the present hour men like Paul de Casamagner exercise, as a statesman and écrivain, and an editor of the Pays must be an adept with swords and pistols no less than a skilled writer.

As a complete history of duelling would far exceed the limits of this article, we have preferred to trace in some detail its rise and fall in the country where it has most prevailed. We are thus compelled to pass by other nations, and conclude with a brief epitome of its annals at home. Duelling did not begin in England till some hundred years after it had arisen in France. There is no instance of a private duel fought in this country before the 16th century, and they are rare before the reign of James I. A very fair notion of the comparative popularity of duelling, and of the feeling with which it was regarded at various periods, might be gathered by examining the part it plays in the novels and lighter literature of the times. The earliest duels we remember in fiction are that in the Jouuvetaine between Sir Percivale Shafton and Halbert Gibbons, and that in Kenilworth between Tressilian and Varney. (That in Anne of Gerstein either is an anachronism or must reckon as a wager by battle.) Under James I. we have the encounter between Nigel and Lord Dalgarne. The greater evil of war, as we observed in French history, expels the lesser, and the literature of the Commonwealth is in this respect a blank. With the Restoration there came a reaction against Puritan morality, and a return to the gallantry and loose manners of French society, which is best represented by the theatre of the day. The drama of

1 Volturle met the Chevalier Bfohan-Chabot at the house of the Marquis de Sully. The Chevalier, offended by Volturle's free speech, incautiously asked the Marquis, "Who is that young man?" "One," replied Voltaire, "who, if he does not parse a great name, honours that he bears." The Chevalier said nothing at the time, but, hearing that Voltaire had inveighed against him, he called upon Voltaire in his coach, and told him he must be free of his footmen. Voltaire set to work to learn fencing, and then sought the Chevalier in the theatre, and publicly challenged him. A duel was fought, and the Chevalier's expenses were the only satisfaction that the philosopher could obtain. "Monseigneur, en quelque affaire d'interest vous voulez pour une point e'gale, Parmeur dous j'ay a me plaire; il peut en ce monde meus. Rousseaun manque alors." The Chevalier was said to employ his capital in petty usury.
the Restoration abounds in duels. Passing on to the reign of Queen Anne, we find the subject frequently discussed in the *Tatler* and the *Spectator*, and Addison points in his happiest way the moral to a contemporary duel between Mr. Thornhill and Sir Cholmeley Dering. "I come not," says Spinmont to King Pharamond, "I come not to implore your pardon, I come to relate my sorrow, a sorrow too great for human speech to support." "Know that this morning I have killed in a duel the man whom all men living I love best." No reader of Esmond can forget Thackeray's description of the doubly fatal duel between the duke of Hamilton and Lord Mohun, which is historical, or the less life-like though fictitious duel between Lord Mohun and Lord Castleraigh. Throughout the reigns of the Georges they are frequent. Richardson expresses his opinion on the subject in six voluminous letters to the Literary Repositor. Sheridan, like Farquhar in a previous generation, not only dramatized a duel, but fought two himself. Byron thus commemorates the bloodless duel between T. Moore and Lord Jeffrey:

*Can none remember that eventful day,*
*That ever glorious almost fatal fray,*
*Where Little's leadless pistols met the eye,*
*And Bow Street myrmidons stood laughing by!*

As we approach our own times they become rarer in fiction. Thackeray, indeed, who represents an older generation, and the worse side of aristocratic society, abounds in duels. His royal highness the late lamented commander-in-chief had the greatest respect for Major Macmurdie, as a man who had conducted scores of affairs for his acquaintance with the greatest prudence and skill, and Rawdon Crawley's duelling pistols, "the same which I shot Captain Marker," have become a household word. Dickens, on the other hand, who depicts contemporary English life, and mostly in the middle classes, in all his numerous works has only three, and George Eliot never once refers to a duel. Tennyson, by using a poet's privilege, but laid the scene of a duel in the year of the Crimean war, but he echoes the spirit of the times when he stigmatizes "the Christless code that must have life for a blow."

To pass from fiction to fact, a list of the celebrated public men who in the last century have fought duels will suffice to show the magnitude of the evil:—Fox, Pitt, William Pulteney and Lord Harvey, Canning and Lord Castleraigh, the duke of York, the duke of Richmond, Wilkes, Sir Francis Burdett, Grattan, Daniel O'Connell. For particulars we must refer the reader to the respective correspondences, of which we find the subject frequently discussed in the *Esmond*. The next important date is the year 1843, when publicists that Bentham was the first to point out clearly this defect of the law, and propose a remedy. In his *Introduction to the Principles of Morals and Legislation*, published in 1789, Bentham discusses the subject with his usual boldness and logical precision. In his exposition of the absurdity of duelling considered as a branch of moral justice, and its inefficiency as a punishment, he only restates in a clearer form the arguments of Paley. So far there is nothing novel in his treatment of the subject. But he soon parts company with the Christian moralist and proceeds to show that duelling does, however rudely and imperfectly, correct and repress a real social evil. "It entirely effaces a blot which an insult imprints upon the honour. Vulgar moralists, by condemning public opinion upon this point, only confirm the fact." He then points out the true remedy for the evil. It is to extend the same legal protection to offences against honour as to offences against the person. The legal satisfactions which he suggests are some of them extremely grotesque. Thus for an insult to a woman, the man is to be dressed in a woman's clothes, and the retort to be inflicted by the hand of a woman. But the principle indicated is a sound one, that in offences against honour the punishment must be analogous to the injury. Doubtless, if Bentham were alive, he would allow that the necessity for such a scheme of legislation had in a great measure passed away. That duels have since become extinct is no doubt principally owing to social changes, but it may...
be in part ascribed to improvements in legal remedies in the sense which Bentham indicated. A notable instance is Lord Campbell's Act of 1843, by which, in the case of a newspaper libel, a public apology coupled with a pecuniary payment is allowed to bar a plea. In the Indian Code there are special enactments concerning duelling, which is punished not as murder but as a civil disability.

Suggestions have from time to time been made for the establishment of courts of honour, but the need of such tribunals is doubtful, while the objections to them are obvious. The present tendency of political philosophy is to contract rather than extend the province of law, and any interference with social life is justly resented. Real offences against reputation are sufficiently punished, and the rules of the lawyers, that mere securnity or opprobrious words, which neither of themselves import nor are attended with any hurtful effects, are not punishable, seems on the whole a wise one. What in a higher rank is looked upon as a gross insult may in a lower rank be regarded as a mere pleasantry or a harmless joke. Among the lower orders offences against honour can hardly be said to exist, the learned professions have each its own tribunal to which its members are amenable, and the highest ranks of society, however imperfect their standard of morality may be, are perfectly competent to enforce that standard by means of social penalties without resorting either to trial by law or trial by battle.


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Switzerland. He had already proved his fitness for the task by making a cadastral survey of the canton of Geneva, and publishing a map of the canton in four sheets on the scale of 1:23,000. The larger part occupied thirty-two years, and was accomplished with complete success. The map in 25 sheets on the scale of 1:23,000 was published at intervals between 1842 and 1853, and is an admirable specimen of cartography. In recognition of the ability with which Dufour had carried out his task, the Federal Council in 1863 ordered the highest peak of Monte Rosa to be named Dufour Spitsre. In 1867 Dufour received the command of the Federal Army, which was employed in reducing the revolted Catholic cantons to submission. The quickness and thoroughness with which he performed the painful task, and the wise moderation with which he treated his vanquished fellow-countrJemen, were acknowledged by a gift of 60,000 francs from the Duets and various honours from different cities and cantons of the confederation. In politics he belonged to the moderate conservative party, and he consequently lost a good deal of his popularity in 1848. In 1867 he presided over the International Conference which framed the so-called Geneva Convention as to the treatment of the wounded in time of war. He died on the 14th July 1875. Dufour was the author of a Mémorie sur l'état des anciens et de celui du moyen-âge (1840), De la fortification permanente (1850), Manuel de tactique pour les officiers de toutes armes (1842), and various other works in military science.

DUFRENOY, Pierre Armand, geologist and mineralogist, was born at Souvan, in the department of Semur-Douze, in France, in 1792, and died March 20, 1857. After leaving the Imperial Lyceum in 1811, he studied till 1815 at the Polytechnic School, and then, at the age of twenty-one, entered the corps of mines. In conjunction with M. Elie de Beaumont he in 1841 published a great geological map of France, the result of investigations carried on during thirteen years (1823-1836). Five years (1836-41) were spent in writing the text to accompany the map. The two authors had already together published L'opinion métallurgique en Angleterre (1827, 2d ed. 1837-39), Mémôr• pour servir à une description géologique de la France (1830-38), and a Mémorie sur Cantal et Mont-Dore (1833) of other literary productions. After his death, Dufreney became an accountant of the iron-mines of the eastern Pyrenees (1834), a trauùte on mineralogy (1844, 2d ed. 1856-60), and numerous papers contributed to the Annales des Mines and other scientific publications, one of the most interesting of which is entitled "Des terrains sédimentaires du Néolithique," and now a member of the Academy of Sciences, a commander of the Legion of Honour, an inspector-general of mines, and professor of geology at L'Ecole des Ponts et Chaussées, and of mineralogy at the Imperial School of Mines, of which latter institution he was the director.

DUFRESNY, Charles Rivière (1618-1728), a French dramatist, better remembered by the comedy of his own life than by any of the numerous plays which he contributed to the Théâtre Italien and the Théâtre Français, the fact that his grandfather was an illegitimate son of Henry IV procured him the liberal patronage of Louis XIV, who not only gave him the post of vice-de-chambre, but adopted his name now to one lucrative privilege and now to another. The poet, however, appeared as eager to squander as the king was to bestow, and the pathetic confession of exhausted generosity—"I cannot enrich Dufresny,"—was probably taken by the careless spendthrift as a signal compliment; though to one of his friends who ceased him with the remark that poverty is no sin, he replied, "It is a sin." On Louis' death he was almost as excommunicated as Louis had ever lived, but he obtained 200,000 francs from the duke of Orleans in answer to an ingenious request.
that his highness for his own glory would leave Dufresny in his excessive indulgence as a sole example of the condition of the whole kingdom before the golden days of his regency. As if to furnish a piquant commentary on the proverb that poverty makes us acquainted with strange bedfellows, he married his washerwoman in discharge of her bill—a whimsicality which supplied Le Sage with an episode in the Double Bonheur, and was made the subject of a volume by J. M. Deschamps—Charles Dufresny, on le mariage surprenant. Clever, versatile, and superficial, he obtained in his own day a considerable reputation not only as an author and a wit, but also as a landscape gardener and architectural designer: to his great patron he furnished plans for the park at Versailles, and was appointed in return overseer of the royal grounds. He died at Paris in 1728 in a house—la maison de Plaine—which he had built with the regent's bounty. His plays, destitute for the most part of all higher qualities, but abound in sprightly wit and pithy sayings, are no longer acted; though a few of the many in the six volumes of his Théâtre (Paris, 1747) are still read. L'Esprit de contradiction (first acted in 1700), Le double venage (1702), La coquette du village, and Le mariage fast and farrare are reprinted in the second volume of Dolido's Choix d'œuvres des auteurs comiques, and his contributions to the théâtres Haliacres produced in collaboration with Deschamps or Desnoettes, may be found in Gherard's collection. A volume of Poèmes divers, two volumes of Nouvelles historiques, Loye, 1692, and Les amusements sérieux et comiques d'un Siamois, 1697, a work to which Montesquieu was indebted for the idea of his Lettres Persanes, complete the list of Dufresny's writings. Two volumes of Oeuvres Choisis were edited by Auger in 1801.

DUGDALE, Sir William (1605—1666), an eminent English antiquary, the only son of John Dugdale, who belonged to an old Lancashire family, but had sold his property in that county and bought the estate of Shustoke, near Colehill, in Warwickshire, was born on the 12th September 1605. He received the early part of his education from Thomas Sibley, a curate near Shustoke, and attended from his tenth to his fifteenth year the Free School at Coventry, whence returning to his father, he read with him for some time law and history. In compliance with his father's wish, who was old and infirm, and desired to see him married before he died, he was married at the early age of seventeen to the daughter of a gentleman in the county of Stafford. He lived in his wife's father's house until the death of his own father in 1624, and soon thereafter went to reside at Fillongley, near Shustoke, an estate formerly purchased for him by his father. In 1623 he purchased the manor of Blyth, in the parish of Shustoke, and, preferring it as a place of residence, removed thither in 1626. His inclination to the study of antiquities manifested itself at an early age, and received its first encouragement from Samuel Roger, the barrister of Lincoln's Inn. After his settlement at Blyth Hall he made the acquaintance of some gentlemen interested in antiquities, who enabled him to obtain a sight of the old deeds and evidences of the county families of Warwickshire, and a divers antient writings of consequence, with the view of his writing a history of that county. In 1633 he accompanied Sir Simon Archer to London, and was by him introduced to Sir Henry Spelman, which led to his acquaintance with Thomas, earl of Arundell, then earl marshal of England, by whom he was, in 1638, created a pursuivant of arms extraordinary by the name of Blanche Lyon, and in 1639 governor-pursuivant in ordinary. About this time he agreed to write his work on Monastery Foundations, and, having a lodging in the Herald's Office, he soon spent much of his time in London in order to augment his collections out of the records of the Tower and other places in the city. In 1641 Sir Christopher Hatton, a member of the House of Commons, dreading the near approach of the revolutionary storm which soon thereafter broke over England, and the ruin that might then ensue, got him to make exact drafts of all the monuments in Westminster Abbey and the principal churches in England, including Peterborough, Ely, Norwich, Lincoln, Newark, Beverley, Southwell, Selby, Kingston-upon-Hull, Chester, Tamworth, and Warwick. He received and obeyed, in June 1642, the summons of Charles I. to attend him at York, whither, on the outbreak of the revolution, the king had betaken himself for the sake of greater security. Learning the spread of the revolution in Warwickshire, Charles deputed him to summon to surrender the castle of Banbury, in Oxford, and the castle of Warwick, which were being rapidly filled with ammunition and rebels. Banbury obeyed, but Warwick, being better prepared, contested the summons and its inmates were proclaimed traitors. He also summoned the city of Coventry; and, accompanying Sir Richard Wylly, as guide, he was present at the battle of Cudworth Field, the result of which he communicated to the king. He remained at Oxford with the king till the surrender of the garrison in 1646, and witnessed the battle of Edgehill, of the field of which he made afterwards an exact survey, noting how the armies were drawn up, and where and in what direction the various movements took place, and marking the graves of the slain. In November 1642 he was admitted M.A. of the university, and in 1644 the king created him Chester-Harward. While at Oxford he made a journey to Worcester, where—with the purpose of increasing his collections for his history of Warwickshire—he perused the registers of the bishop and of the dean and chapter; and during his Oxford leisure he applied himself also to the search for antiquities in the libraries and in the private houses. When Oxford surrendered he continued his antiquarian researches in London, along with Richard Dukworth, for their joint work on the monasteries, which was published successively in single volumes in 1655, 1664, and 1673. At the Restoration he obtained the office of Norroy king-at-arms, and in 1677 was created greater principal king-at-arms, and was knighted. He died at Blyth Hall, 10th February 1686.

Besides the works on Warwickshire, published in 1656, and Monasticon Anglicanum, republished in 6 vols in 1817—30, and again in 8 volumes in 1646, Sir William Dugdale is the author of History of St Paul's Cathedral (1658), the Barons of England (3 vols, 1674—6), and other works of less importance. His MSS, many of which were sold by himself up to 1678, with his diary and correspondence, and an index to his manuscript collections, was edited by William Hamper, and published in 1827.

DUGONG (Halicoerus), a genus of herbivorous Cetacea, forming, along with the Sea-Cows (Manatus), and the now extinct Rhytina, the sub-order Sireni. In this genus the head is small, and is abruptly truncated in front, the snout being remarkably obtuse and furnished with bristles. The intermaxillary bones are enormously developed, and from these proceed two large incisor teeth or tusks, which are well developed in the male, but which in the female are arrested in their growth, and remain concealed beneath the surface. There are never more than five molar teeth on each side of either jaw, or twenty in all, and these are flat on the grinding surface. The flippers are unpivoted with nails, and the tail is broad, and differs from that of the manatees in being crescent-shaped instead of rounded. The bones are very hard and firm, and take a polish equal to that of ivory. The dugongs frequent the shallow waters of the tropical seas, extending from the east coast of Africa, north of the mouth of the Zambesi river, along the shores of the Indian, Malay, and Australian seas, where they may be seen basking on the surface of the water, or browsing on submarine pastures of Algae and Fuct, for which the
trick obuse lips and truncated snout preeminently fit them. They are gregarious, feeding in large numbers in localities where they are not often disturbed. The female produces a single young one at a birth, and is remarkable for the great affection it shows for its offspring, so that when the young dugong is caught there is no difficulty in capturing the mother with it. There are two species—the Indian Dugong (Halocerus indicus) and the Australian Dugong (Halocerus australis). The former is very abundant along the shores of the Indian Ocean, and is captured in large numbers by the Malayan, who esteem its flesh as a great delicacy; while the lean portions, especially of young specimens, are regarded by Europeans even as excellent eating. It is generally taken by spearing, the main object of the hunter being to raise the tail out of the water, when the animal becomes perfectly powerless. It seldom attains a length of more than 8 or 10 feet. The Australian Dugong is a larger species, attaining sometimes a length of 15 feet. It occurs along the Australian coast from Moreton Bay to Cape York, and is highly valued by the natives, who hunt for it with spears, and gorg themselves with its flesh, when they are too exhausted to secure a carcass. In recent years the oil obtained from the blubber of this species has been largely used in Australia as a substitute for cod-liver oil. It does not contain soine, but is said to possess all the therapeutic qualities of cod-liver oil without its nauseous taste. A full grown dugong yields from 10 to 12 gallons of oil, and this, according to Bennett, "forms in cold weather a thick mass, and requires to be melted before a fire previously to being used." According to the same authority, the flesh of the Australian dugong is easy of digestion, the muscular fibre when fresh resembling beef, and when salted having the flavour of excellent bacon. In the earliest Australian dugong fishery, natives were employed to harpoon these cetaceans, they soon, however, became too wary to allow themselves to be approached near enough for this purpose, and the harpoon was abandoned for the net. The latter is spread at night, and in its meshes dugongs are caught in considerable numbers. The skin is nearly half an inch thick, and can be made into gelatine or glue.

DUGUAY-TROUIN, René (1673-1736), a famous French admiral, was the son of a sea captain, and was born at St Malo on the 10th June 1673. He was originally intended for the church, and studied with that view at Rennes and Caen; but on the breaking out of the war with England and Holland in 1689 he obtained leave to enter the marines. Accordingly he embarked in the capacity of a volunteer on board a small vessel of 18 guns, equipped by his family, and during the first three months his courage was tried by a violent tempest, an imminent shipwreck, the boarding of an English ship, and the threatened destruction of his own vessel by fire. The following year, as a volunteer in a vessel of 26 guns, he carried off the honours in a bloody combat with an English fleet of five merchant vessels. The courage he then showed was so remarkable that in 1691, at the age of eighteen, he obtained the command of a frigate of 14 guns, when, having been thrown by a tempest on the coast of Ireland, he burned two English ships in the river Limerick. In 1694 his vessel of 40 guns was captured by the English, and, being taken prisoner, he was confined in the castle of Plymouth, where, however, he made love to the daughter of the jailer, and by her aid managed to escape. He then obtained command of a vessel of 48 guns, and made a capture of English vessels on the Irish coast. In 1696 he made a brilliant capture of Dutch vessels, and the king hearing an account of the affair raised him in 1697 to the rank of captain of a frigate. In 1704-5 he desolated the coasts of England. In 1706 he was raised to the rank of captain of a vessel of the line. In 1707 he was made chevalier of the order of St Louis, and captured the greater part of an English convoy of troops and munitions bound for Portugal. His most glorious action was the capture in 1711 of Rio Janeiro, on which he imposed a heavy contribution. In 1715 he was made chief of a squadron, and in 1726 commander of the order of St Louis and lieutenant-general. In 1731 he commanded a squadron for the protection of French commerce in the Levant. He died 27th September 1736.

DU GUESCLIN, Bertrand (c. 1314-1380), constable of France, the most famous French warrior of his age, was born of an ancient but undistinguished family, at the castle of La Motte-Broon, near Rennes, about 1314. The date is doubtful, the authorities varying between 1311 and 1324. The name is spelt in various ways in contemporary records, e.g., Clasquin, Clayquin, Guyayquin, etc. The familiar form is found on his monument at St Deux, and in some legal documents of the time. In his boyhood Bertrand was a dull learner, spending his time in open air sports and exercises, and could neither read nor write. He was remarkable for ugliness, and was an object of aversion to his parents. He first made himself a name as a soldier at the tournament held at Rennes in 1336 to celebrate the marriage of Charles of Blois with Jeanne de Penthièvre, at which he unseated the most famous competitors. But this playing at fighting was not enough for his ambition, and in the war which followed between Charles of Blois and John de Montfort, for the possession of the duchy of Brittany, he served his apprenticeship as a soldier. As he was not a great baron with a body of vassals at his command, he put himself at the head of a band of adventurers, and fought on the side of Charles and of France. He distinguished himself by a brilliant action at the siege of Yenne in 1312, and after that he disappears from history for some years. In 1331, having shortly before been made a knight, he was sent into England with the lords of Brittany to treat for the ransom of Charles of Blois, who had been defeated and captured by the English in 1347. When Rennes was besieged by the duke of Lancaster, in 1356, Du Guesclin forced his way with a handful of men into the town, and successfully defended it till June 1357, when the siege was raised in pursuance of the treaty of Bordeaux. For this service he was rewarded with the lordship of Rochefort. At the expiration of the truce he distinguished himself by the defence of Dinan, and here he engaged in single combat with Sir Thomas Canterbury. Shortly afterwards he married, and about the same time he passed into the service of France, and greatly distinguished himself at the siege of Melun (1359). In April 1364, in conjunction with Boucicaut, he recovered Montes and Meulan from the king of Navarre, and in May he defeated the Navarrese under Capitul de Buch at Cocherel, and took their leader prisoner. The king now created him marshal of Normandy and count of Longueville. At the battle of Aaray, in September of the same year, Charles of Blois was defeated and killed, and Du Guesclin taken prisoner, by Sir John Chandos. The grand companies beginning, after the close of the war, to play a part of brigands in France, it was necessary to get rid of them. Du Guesclin was ransomed for 100,000 crowns, and was charged to lead them out of France. He marched with them into Spain, visiting Avignon on the way, and extorting from the Pope a large sum of money and his abdication. Du Guesclin now supported the party of Trastamara against Peter the Cruel, set the former upon the throne of Castile (1366), and was made constable of Castile and count of Trastamara. In the following year he was defeated and captured by the Black Prince, ally of Peter the Cruel at Najara, but was soon released for a heavy ransom. Once more he fought for Henry, reinstated him on the throne.
(1389), and was created duke of Molins. In May 1370, at the command of Charles V, who named him constable of France, he returned to France. The War had just been declared against England, and Du Guise was called to take part in it. For nearly ten years he was engaged in fighting against the English in the south and the west of France, recovering from them the provinces of Poitou, Guienne, and Aquitaine, and the powerful duchy of a united France. In 1373, when the duke of Brittany sought English aid against a threatened invasion by Charles V, Du Guise was sent at the head of a powerful army to seize the duchy, which he did; and two years later he frustrated by a defensive policy the attempt of the duke with an English army to recover it.

In 1379 that the king entertained suspicions of his fidelity to him, he resolved to give up his constable's sword and retire to Spain. His resolution was at first proof against remonstrance; but ultimately he received back the sword, and continued in the service of France. In 1380 he was sent into Languedoc to suppress disturbances and brigandage, provoked by the harsh government of the duke of Anjou. His first act was to lay siege to the fortress of Châteauneuf Randon, held by the English, strongly garrisoned and well provisioned. A day was fixed conditionally for the capitulation. Meanwhile the great warrior was as smitten with a mortal illness, and died, July 13, 1380. The commander led out the garrison and deposed the keys of the castle on the coffin of the hero. Du Guise lost his first wife in 1371, and married a second in 1373, but he left no legitimate children. His remains are interred, by order of the king, in the church of St. Denis.

Of the numerous recent biographies of Du Guise, the most recent is the learned work by D. F. Jamison (Charleston, 1865), which was translated into French by J. Bassac by order of Marshal Count Rambaud, minister of war, and published in 1866.

DUHALDE, Jean Baptiste (1674–1743), geographical writer, was born at Paris, February 3, 1714. In 1743 he entered into the Society of Jesus, and some time afterwards he was appointed to succeed Father Legobien, who had been intrusted with the duty of collecting and arranging the letters which they received from their missionaries in different quarters of the globe. He was also for some time secretary for the famous Father Le Teller, confessor to the king of France. He died August 18, 1743. Duhaldale is represented as a man of mild and amiable character, and as remarkably alike for his unaffected piety and unweared industry. He was the author of some Latin poems, which do not evince any superior degree of excellence. The productions for which he is principally distinguished are—

1. Lettres Édifiantes et Curieuses écrites des Missions Étrangères, which he edited with great ability from the ninth to the twenty-sixth volume inclusive, and which have been translated into English and German; and (2) Description géographique, historique, chronologique, politique, et physique de l'Empire de la Chine et de la Tartarie Chinoise, Paris, 1735, in four volumes large folio, with figures and an atlas by D'Anville. This work, the first in which China is described with so much exactness and detail, is a beautiful specimen of French typograph. An English translation by Brookes was published in 1736 in 4 vols.

DUHAMEL, Jean Baptiste (1624–1706), a French astronomer and physician, was the son of an advocate, and was born at Vire, in Normandy, in 1624. He commenced his studies at Caen, and completed them at Paris. At the age of eighteen he wrote a treatise on the Spherae of Theodorus, and added to it a tract on trigonometry, designed as an introduction to astronomy. At the age of twenty-one he became cure of Neully-sur-Marne, but without neglecting the duties of his calling, he continued to cultivate the physical sciences with zeal. In 1655 he was named almoner of the king; in 1653 he obtained the presidency of the council of the church of Burgundy. In 1660, when Louis XIV. established the Royal Academy of Sciences, he was appointed perpetual secretary. He was preparing a history of the Academy when he died, August 6, 1706. He published numerous works on philosophy, divinity, and physical science.

DUHAMEL DU LANCEAU, Henry Louis (1700–1782), a celebrated French botanist and agriculturist, was the son of Alexandre Duhamel, lord of Denanvilliers, and was born at Paris in 1700. He was placed at the Collège d'Harcourt, but made little progress in his studies, except that, notwithstanding the imperfect manner in which the natural sciences were then taught, he acquired such a taste for those branches of knowledge as led him to attend the lessons of Dufay and Bernard de Jussieu at the Jardin des Plantes. He spent his time between the capital, where he pursued his botanical studies and held intercourse with scientists, and his estates at Gâtinais, where he employed his knowledge in agricultural experiments. Having been requested by the Academy of Sciences to investigate the cause of the disease which was destroying the saffron plant in Gâtinais, he discovered that its destruction was owing to a parasitical fungus which attacked itself to its roots. The work in which he demonstrated his discovery was judged worthy to appear in the transactions of the Academy, and gained him admission to that body in 1728. From then until his death he basied himself chiefly with making experiments in vegetable physiology, and recording and publishing his observations. Having learned from Sir Hans Sloane that madder possesses the property of giving colour to the bones, he fed animals successively on food mixed and unmixed with madder; and he found that their bones in general exhibited concentric strata of red and white, whilst the softer parts showed in the meantime signs of having been progressively extended. From a number of experiments he was led to believe himself able to explain the growth of bones, and to demonstrate a parallel between the manner of their growth and that of trees. Along with the celebrated naturalist Buffon, he made numerous experiments on the growth and strength of wood, one of the results of which was that he recommended the bark to be taken off the trees several years before they are cut down. He experimented also on the growth of the mistletoe, on layer planting, on smut in corn, and on the production of soda and potash by different vegetables. From the year 1740 he made meteorological observations, and kept records of the influence of the weather on agricultural production. Having been appointed inspector-general of marine, he applied his scientific acquirements to the improvement of nautical knowledge, subjecting everything to the test of facts and experiments. Duhamel's aim in his researches was rather to be useful than to gratify his own curiosity or to win fame. He made himself accessible to all who sought information from him, and his modesty was as great as his knowledge. He was scrupulous in the practice of his religious duties. He died August 13, 1782.

His works are generally of an elementary character, and from the minute details of their information are rather prolix. They number nearly 90 separate publications, the principal of which are—Traité des arbres et arbustes qui se cultivent en France en pleine terre; Éléments de l'architecture navale; Traité général des pêches maritimes et fluviales; Éléments d'agriculture: La physique des arbres, Des semis et plantations des arbres et de leur culture. De l'exploitation des bois; Traité des arbres fruitiers.

DUISBURG, a town of Prussia, at the head of a circle in the government of Dusseldorf, situated at an important railway junction in the curve between the Rhine and the Ruhr, and communicating with both rivers by a canal. It has a fine Gothic church—Salwetzkirche—of the 15th century, a gymnasium, and an orphan asylum, and is also
the seat of a great Protestant Diakonieanstalt, or Deacon's Institute, founded in 1844 by Engelbert, and forming the centre of a large organization for philanthropic action. Its importance, however, is mainly due to the great development of its industry, which deals on an extensive scale with various branches of engineering and the iron manufacture, as well as with cotton—both yarn and cloth—tobacco, sugar, and a number of chemical stuffs, such as alum, soda, and Prussian blue. Probably known to the Romans as Castrum Deutons, and mentioned under the Frankish kings as Desargum, Dussburg early attained the rank of an imperial free town, passed in 1299 to Cleves, and afterwards to Brandenburg, and from 1655 to 1818 was the seat of a university, transferred in the latter year to Dusseldorf.

Population in 1871, 30,533.

DUKE (Latin, dux), next to the princes and princesesses of the blood royal, and the four archbishops of England and Ireland, the highest order and rank of the British peerage. The title of duke was introduced into England when, by a charter dated 17th March 1337, the lordships, castles, lands, &c., constituting the earldom of Cornwall, were erected by King Edward III. into a duchy, and were conferred upon his eldest son Prince Edward of Woodstock, afterwards so well and honourably known as the Black Prince, who thus as Duke of Cornwall was the first English duke. When, in 1343, he was created to the dignity of Prince of Wales, the Black Prince was invested with a coronet, a gold ring and a silver rod. And, as duke of Cornwall, he had already been invested with a sword. The second of the English dukes was Henry, Earl of Lancaster, Derby, and Leicester, and count of Providence, who in 1351 was created Duke of Lancaster.

Of the form and ornament of the princely coronet of the Black Prince no representation or descriptive record is known to exist, nor is it known whether any distinctive coronet was ever assigned to the prince as the insign of his ducal rank. As now worn, a duke’s coronet has eight golden leaves of a conventional type (commonly called, but without any reason whatever, “strawberry-leaves”), set erect upon a circlet of gold, and having their stalks so connected as to form them into a wreath. In representations, three only of the leaves, with two half leaves, are shown. Of late years this coronet has inclosed, and in representations is shown to inclose, a cap of crimson velvet, surmounted by a rich golden tassel, and lined and guarded with ermine (Fig. 1), but, still more recently, the coronet is commonly represented, with much better taste, with neither cap or lining of any kind, as in Fig. 2. The opinion is prevalent that this distinctive form of coronet appears for the first time placed about the basinet of Prince John of Eltham, the younger brother of Edward III., who died in 1356, in his monumental effigy in Westminster Abbey. That there is no foundation for such a supposed origin of the ducal coronet is evident from the effigy itself, since the decorations of the headdress and of the rest of the armour are precisely the same, and they also are identical with similar decorations that appear in other effigies of about the same date. The decoration, however, that is carved upon the basinet of Prince John may probably have suggested the crest-coronet, which in the 15th century so frequently supported roughly Cruzes. It must be added that the basinet in the effigy of Prince John certainly once was inclosed by a plain narrow fillet, probably of gold, for the reception of which a channel still appears, slightly sunk in the alabaster immediately below the band of conventional leafage that is carved in low relief. The effigy of the Black Prince himself (1376), at Canterbury, exhibits on the basinet a decorative accessory that may possibly have been the prototype of the leaf-crowned circlet re-trusted to dukes in later times. From the jewelled band or fillet that encompases this basinet there rise sixteen leaves, with a second series of the same number of tresses of much smaller size alternating with the larger leaves, the stalks of the whole being composed. These larger leaves differ very slightly from those that are carved upon the armour of Prince John of Eltham, and they are in exact accordance with a favourite form of decorative foliage in general use when the effigy was executed. In his will, Lionel, Duke of Clarence, who died in 1388, bequeathed the “two golden circles,” with one of which he states that he himself had “created a duke,” while with the other his elder brother, the Black Prince, had been “created a prince.” It may be accepted as certain that for a considerable time the coronets of “both” dukes and earls were decorated rather after an arbitrary than in accordance with any established rule. Thus, more than a century after the death of the Black Prince, the coronet of John de la Pole, KG, Duke of Suffolk, has the circlet heightened with fleurs-de-lis alternating with clusters of three small tails. The exact period at which the distinctive enframements of the coronets of the different orders in the British peerage was determined and established still remains undecided.

In early times, the rank, dignity, and title of duke were directly associated with power, authority, and local possessions, which constituted and were inseparable from his dukedom; but, after a while, these associations gradually became weakened, and at length for the most part they ceased to exist of necessity, so that at the present day the connection between a duke and the locality that gives the title to his dukedom may be very slight indeed.

This same title, duke, is borne still, with their princely rank and title, by the princes of the royal family, as it was in the days of Edward III., but these royal dukedoms, notwithstanding that they constitute peerages and are hereditary, are created chiefly with a view to connect the members of the reigning house with the great cities or with certain provinces of the realm. The old royal dukedom of York is now so far in abeyance that since the last duke of York died without issue, no duke of York has been created. The rival royal dukedom of Lancaster, since the accession of Henry IV., has been merged in the crown. The dukedom of Cornwall is held by the heir apparent, At various periods also, and in different countries, this same title, duke, has been in use to denote certain princes who were the actual sovereigns of small states, or others who, while vassals of some great suzerain, enjoyed in an approximate degree a virtual independence. The term duke, again, was introduced into their English version by the translators of the Old Testament, as a becoming title for certain chieftains and potentates, the Oriental sheiks of a remote antiquity.

A duke in the British peerage, not of royal rank, is styled “Your Grace,” and he as “Most Noble,” his wife as “a duchess,” and she as “Most Noble Dame.” All their sons are “lords,” and all their daughters are “ladies.” But their eldest son bears his father’s “second title,” since each of the higher ranks of nobility has one or more of the lower ranks associated with it; thus a duke’s eldest son always ranks as a marquis, and generally bears that title. The parliamentary mantle...
or robe of a duke is scarlet, and has four doublings of ermine. The royal dukes have coronets as princes. The coronet of a duchess is the same as that of her husband.

The titles arch-duchess and arch-duchesse, grand-duke and grand-duchesse, are in use on the Continent, the former in Austria and the latter in Russia, to distinguish the princes and princesses of the imperial families. The title grand-duke has also been applied to certain of the minor Continental independent princes.

DUKINFIELD, a township and local board district of England, in East Cheshire, forming part of the parliamentary borough of STAPLEBRIDGE, which see.

DULCAMARA, so named from its taste, at first bitter and eventually sweet, is a drug consisting of the dried young branches of Solanum Dulcamara, Ritter-sweet or Woody Nightshade—a woody perennial of the natural order Solanaceae. It has a slender shrubby and climbing stem; flowers in lateral or terminal cymes, with a hypogynous purple corolla, and yellow anthers converging into a cone; and fruit a red, oval, scarlet berry. For medical purposes the branches are collected in autumn when the leaves are shed. Dulcamara contains an alkaloid solanum, C₁₆H₂₈NO₁₆ (Zwenger and Kind), besides a sweet and bitter principle, dulcamarine or pyroclorine, and other matters. The drug was formerly supposed to be efficacious in a great variety of complaints. It appears to have some effect on the skin and kidneys, and the infusion is now administered in chronic skin diseases, cachectic conditions of the system, and rheumatic affections.

See D. Carlyle, Das Solanum, Strasburg, 1864; Garred, Mediera Medica, 4th ed. 1874.

DULCIGNO, a town of Turkey in Europe, in the Albanian sanjak of Scutari, occupying a bold promontory on the Adriatic, eighteen miles W.S.W. of the town of Scutari. It has a strong castle, is the seat of a Catholic bishop, and numbers about 8000 inhabitants, who are mainly engaged in agriculture, but also carry on a little ship-building and a certain amount of foreign commerce. The Turkish Olkin, or Olgon, preserves more distinctly the ancient name of Olcium, by which Dulcigno was known to the Romans, who obtained possession of it about 167 B.C., during the war with the Carthaginians, the Illyrian king. In modern history the town is noted for the defeat of the Venetians in 1718; and its inhabitants long remarkable for their piracies.

DULUTH, a city and lake port of the state of Minnesota, advantageously situated at the south-west extremity of Lake Superior, about 150 miles north-east of St Paul. It forms the eastern terminus of the Northern Pacific railroad and the northern terminus of the Lake Superior and Mississippi railroad. A ship canal, 250 feet wide, which has been cut across Minnesota point, gives ready access to the town from the lake. Duluth stands on the site of an activity overlooking the lake. It possesses docks, and contains several manufactories. Owning to its position the rise of the town has been very rapid. In 1860 there were not 75 inhabitants, whereas a census in 1875 showed the population to be 5000. It derives its name from Jean Du Luth, a French officer who visited the spot in the 17th century.

DULWICH, a village of England, in the county of Surrey, five miles from London Bridge, remarkable for its college and picture gallery. The manor, which had belonged to the Cluniac monks of Bermondsey, was granted by Henry VIII., in 1541, to Thomas Calton; and his grandson, Sir Francis Calton, sold it in 1606 to Edward Alleyn, whose name is indissolubly associated with the place by his princely foundation. Dulwich College, or, as he quantitatively and piously called it, "God's Gift College" (see Alleyn, vol. I. p. 584), was opened with great state on September 13, 1619, in the presence of Lord Chancellor Bacon, Lord Arundell, Inigo Jones, and other distinguished men. According to the letters patent the scholars and students were to be chosen in equal proportions from the parishes of St Giles (Cambwells), St Botolph without Bishopsgate, and St Saviour's (Southwark), and "that part of the parish of St Giles without Cripplegate which is in the county of Middlesex." By a series of statutes signed in 1626, a few years before his death, Alleyn ordained that his school should be for the instruction of 80 boys consisting of three distinct classes:—(1) the twelve poor scholars; (2) children of inhabitants of Dulwich (who were to be taught freely); and (3) "tows or foreign schollers," who were to pay such allowance as the master and wardens shall appoint. That it was the founder's intention to establish a great public school upon the model of Westminster and St Paul's, with a liberal provision for university training, is conclusively shown by the statutes; but he was scarcely dead when his grand project was overthrown, and for more than two centuries the educational benefits for God's Gift College were restricted to the twelve poor scholars. In 1858, however, the foundation was entirely reconstituted by Act of Parliament. The government of the college is now vested in 19 governors, of whom 14 are nominated by the Court of Chancery and 5 elected by the body of free scholars already mentioned. The first head of the reconstituted college, and the first also who has borne the name of Alleyn, is the Rev. A. J. Carver, D.D. The revenue is at present (1877) more than £17,000 a year, with the prospect of a large and progressive increase. After provision for the expenses of management and the maintenance of the chapel and library, the surplus is divided into four portions, of which three are assigned to the educational and one to the library fund of the college. The educational foundation comprises two distinct schools, the "Upper" and the "Lower." In the latter the curriculum of study, as defined by Act of Parliament, includes, besides ancient and modern languages and mathematics, drawing and designing, civil engineering, physics, chemistry, and other branches of science; in the former it is rather limited to that adopted in so-called middle-class schools. The Upper School contained in 1877 nearly 600 boys, and the Lower nearly 600 girls. The buildings of the Upper School are a splendid pile, designed by Mr Charles Barry, in the "Northern Italian style of the 13th century." They are said to form the most commodious and complete, as probably they have proved the most costly, fabric erected for educational purposes in recent times. The main architectural feature is the interior of the great hall, which will compare advantageously with some of the best college halls at Oxford or Cambridge. There are about 25 acres of play-ground and cricket-field included within the boundary fence of the college. Dulwich College possesses one advantage peculiar to itself in its splendid picture gallery, bequeathed to the college by Sir F. P. Bourgeois, R.A., in 1811, with a separate endowment of £250 a year. The pictures most widely known and most highly appreciated are probably the exquisite Murillos and the choice specimens of the Dutch school. The surplus income of the gallery fund is devoted to instruction in drawing and design in the two schools.

See W. Harnett Blanch, Dulwich College and Edward Alleyn, 1877.

DUMANGAS, a town of the Philippines, in the island of Panay, near the mouth of the river Jaluar. It is situated in a fertile plain, and deals in rice, trepang, and pine. Population stated at 25,000.

DUMARSAIS, CÉSAR CHESNEAU (1676-1756), a French philologist, was born at Marseilles, July 7, 1676. His father died while he was yet an infant; and his mother,
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by her extravagance, disquieted his patrimony. He was educated in his native town by the Fathers of the Oratory, into whose congregation he entered, but feeling the restrains on his liberty too severe, he left it at the age of twenty-five, and repaired to Paris, where he married, and was admitted an advocate in 1704. He soon, however, quitted the bar, separated from his wife, to whom he gave up the little he possessed, and went to reside with the President de Mansions, in the capacity of tutor to his son. He was afterwards successively tutor to the son of Law, the projector, and the son of the Marquis de Bafremont. It was during this last period that he published the results of his grammatical investigations, which were received with great indifference. On terminating his engagement with the Marquis de Bafremont he opened an establishment for education in the faubourg St Victor, which scarcely afforded him the means of subsistence. He strove to eke out his scanty income by contributions to the Encyclopædia, but his last years were spent in very straitened circumstances. He died at Paris on the 11th June 1756, at the age of eighty. Dumas possessed no ordinary talents; his researches are distinguished alike by their accuracy, ingenuity, and depth. As a man, he combined the greatest purity of morals and simplicity of character with a rare degree of mildness in his misfortunes, yet during the greater part of his life he was left to languish in obscurity, and his merits scarcely attracted any notice until nearly half a century after his death. His works on philosophy and general grammar, however, are worthy of attention. Of these, the best are his Principes de Grammaire and his Histoire des Troupes D'Allemberg and Voltaire both paid a just and discriminating tribute to the merits of Dumas. An edition of his works was collected by Duchosal and Milon, and published at Paris in 1737, in seven vols. 8vo. In 1804, the French Institute proposed a prize for an éloge on Dumas, which was gained by De Girando, whose work was published at Paris in 1805, in 8vo. An earlier éloge by D'Allemberg is to be found in the Mélanges de Littérature, and prefixed to the above-mentioned edition of the works of Dumas.

DUMAS, ALEXANDRE (1802-1870), one of the most remarkable characters that the 19th century has produced, was the son of General Dumas and of Marie Labouret, an innkeeper's daughter. His father was an officer of remarkable gallantry, for who his dashes exploits had obtained the odd title of the "Horatius Cocles of the Tuileries." He was a cousin of the illegitimate son of the Marquis Dury de la Paillette, and of Louise Dumas, a black woman of St. Domingo. Long after, his grandson was to excite the laughter of Paris by claiming this title, and the family arms. The general had an insubordinate temper, and excited the dislike and suspicion of Napoleon, who sent him back from Egypt to languish in obscurity, and die of disappointment at Villers-Cotterets in the year 1806.

Alexandre Dumas was born on July 4, 1802, at Villers-Cotterets, where he was brought up under the care of an affectuose and pious mother. Some of the most graceful passages of autobiography are to be found in those pages of his memoirs which are devoted to an account of his boyhood, and which present an excellent picture of French country town life. He seems to have been an ulla and a troublesome youth, and, though places were found for him with notaries and other functionaries, he could not settle to business. The family means were slender. They were soon almost reduced to poverty, and in the year 1833 Alexandre set off for Paris to seek his fortune. The memory of where he was to make such good use of slender opportunities, that within five years his name became famous. Within a few days of his arrival, an old friend of his father's, General Foy, obtained a clerk's place for him in the duke of Orleans's establishment, worth only £50 a year, but it seemed a fortune. A friend, De Loven, and he now joined their talents in a light farce called Le Chasse et l'Amour (produced September 22, 1825). This was succeeded by a dramatic piece, written with the assistance of one of his friends, and called La Nocè et l'Enterrément (November 21, 1826), known in England as the amusing Illustrious Stranger. Meanwhile the visit of Macready and other English players to Paris had introduced him to Shakespeare, and had set him to work on a grand romantic and historical drama which he called Christine. The young clerk had the boldness to look forward to having it presented on the boards of the first theatre in France, and, with an energy and spirit that should encourage every friendless Separatist, sat every resource he could command at work. Charles Nodier introduced him to Baron Taylor, the literary director of the theatre. The agent, if we are to credit Dumas, was so enchanted with the work that he accepted it and submitted it to the company at once. It is more probable that, from the rather corrupt fashion which then regulated such matters, the privilege was secured by the influence of the duke of Orleans. But it happened that another Christine was supported by even greater influence, and Dumas's had to be withdrawn. In a short time he had written Henri III., which was produced (February 11, 1829) with the most extraordinary results. This piece was important as being the first success of the well-known "Roman of the school." Henri III., it is said, bought its author about £2000. But the revolution of July now broke out and interrupted every literary scheme. It was, however, welcomed by the creole's son, who flung himself with ardour into the struggle. And here begins that double interest in his life, which was as a venturesome as that of some of his own heroes, and suggests the career of Bonnemout Collin. He has, of course, made his own share in the exciting scenes of the Three Days as conspicuous as possible, and his expedition to Soissonns, and almost single-handed capture of a powder magazine, a general, and officers were heartily laughed at and wholly disbelieved. Allowing for emblemship, and nothing more, it is believed that the Duke of Orleans, and King Louis Philippe, always treated him with a good humour and contempt.

He now returned to his dramatic labours, and produced Antony (1831), one of the earliest of those gross outrages on public morality which have helped to make congruous mid-Victorian the favourite theme of the French drama. But by this time he had found that the slow production of dramas scarcely offered a profitable field for his talents. The successful founding of the Revue des Deux Mondes tempted him into trying his skill on historical romances, professedly in imitation of Sir Walter Scott. And this would seem to be the first opening of that seam which was to be worked later with such extraordinary profit. Here he introduced that daring system of working up the ideas of others, which he had already carried out in his dramatic labours. His successful pieces of Henri III., and Christine proved to consist of whole scenes stolen from Schiller and other writers almost without changing a word, though the arrangement of the plot and situations are masterly and original. A piece of his, called the Tour de Arelle (produced 1832), which caused a perfect furor in Paris, is said to have cost him £5000. But even this was not enough, however, to a more serious charge of plagiarism. In consequence of a duel he was directed to leave France for a time, and set off—in July 1833—for a tour through
Switzerland, which suggested to him a series of those odd books of travels made up of long extracts from old memoirs, guide-books, imaginary dialogues, and adventures.

In 1842 he married an actress named Idô Ferrier, who had performed in his plays; but the union was not a happy one, and, after a rather extravagant career, the lady retired to a deserted house, where she died in the year 1859. Hitherto his success, though remarkable, could not be called European, and he was not to be distinguished from the crowd of French professional littérateurs. But in 1844 the famous Monte Christo appeared, which may be said to have excited more universal interest than any romance since Balzac's Contes de l'Espagne. The extraordinary colour, the never-failing spirit, the endless surprises, and the air of nature which was cast over even the most extravagant situations, made this work worthy of the popularity it enjoyed in almost every country of the world. It was followed by the less famous Three Musketeers. These productions were the more remarkable as they were written from day to day for the readers of a newspaper, and thus firmly established the feuilleton as a necessary element of French literature. In this, as in other departments where he was successful, Dumas was not original, and only took up the idea of a successful predecessor. Eugène de Secondat, whose Duf Erant had enjoyed much popularity in this shape.

This triumph made him, as it were, irresponsible in the literary world, and suggested to him a series of wholesale operations for supplying the public with books, the history of which makes an extraordinary chapter in literature. He contracted for innumerable stories, each of great length, and to be published at the same time, almost any one of which would be beyond the powers of a single writer. In a single year, 1844, he issued some forty volumes, and later on he engaged himself even more deeply to meet these heavy demands. He began by employing one or two assistants, whose aid he furnished his two great stories; and it may be said that, with his constant supervision and inspiration, his daily direction, suggestion of incidents, manipulation of the ideas of others, consultation, &c., he might almost fairly claim the credit of having written the less famous Monte Cristo and the Three Musketeers. His most valuable assistant was Maquet. Indeed, the chief credit of Dumas's most important stories has been claimed for him; but as he afterwards often tried his powers alone, and with but poor success, it seems probable that his share in Dumas's works was no more than what has been described. But presently the popular writer found that even this form of partnership was too great a tax upon his time, and he began to proceed upon the simpler process of ordering works from clever young writers, to whom he suggested a subject and perhaps a mere outline of treatment—and then issuing their work with his name. Some care in the selection was at first exercised, but later he accepted any stuff that was brought to him—travels, essays, stories—and endorsed them with his name. Indeed a volume could be filled with the odd details and complicated ramifications of this system, which was exposed in the most unsparing fashion by Grenier de Cassagnes, Jacques alias De Mirécourt, and Quérard. Dumas justified his system of appropriating from dead and living authors by a theory of what he called "conquering." "All human phenomena," he says, "are public property. The man of genius does not steal, he only conquers. Everything one arrives in his turn and at his hour, seizes what his ancestors have left, and puts it into new shapes and combinations."

In the meantime he was earning vast sums. Leaving the work of composition to his journeymen, he now entered on a new and reckless course, with a view of dazzling his countrymen and gratifying his own Eastern taste. In this view he built a vast theatre for the production of his own works, and a gorgeous castle at St Germain, on the model of a palace in a fairy tale, on which he lavished every adornment. While these follies were in progress, he succeeded in getting himself attached to the suite of the young duke of Montpensier, then (1840) setting out for Madrid to be married, and received his congé d'armes from the Government to visit Algeria, with a view to making it popular by a lively account from his pen. He was granted a passage to Oran on board one of the Government mail-boats, but, through an awkward misconception, was allowed to divert this vessel from her regular service, and used her for visiting Carthage, Tunis, and other places. On his return there was much scandal, and the minis try was very severely interrogated as to the irregularity of allowing "a contractor for stories" to make so free with public property. It was explained that this was entirely owing to a misrepresentation of the popular writer's. Another rebuff, too, was waiting him; for, having completely neglected his engagements to the various newspapers while making this agreeable tour, he found himself engaged in heavy law-suits with no less than seven journals, including the Constitutionnel et la Presse. After defending himself in person, a performance that was the entertainment of all Paris, he was cast in damages. The Duke, whose name was Carabas, and his actor wife, his actress daughters. His theatre, after opening with one of his pieces which took two nights to perform, fell on evil days, and the revolution of 1848 plunged it into difficulties. In these new scenes he was by no means popular, being suspected from his;//sacrosanct attendance on the Orleans family. By this time all his best works had been written; and he was now only to attract attention by some extravagant literary somersault or impudent attempt at "humbugging" the public. He attempted newspapers like the Moniteur, of which he would grow tired after a few numbers, to every article in which his name stood out. His next excursion was joining Carabals, whose messenger and lieutenant he constituted himself, and, in reward for some trifling service, he claimed the appointment of "director of the museum and explorations" at Naples, an office he was presently forced to resign. After this he was reduced to all manner of devices to maintain himself, always borrowing and obtaining money by shifts and pretences which in another could not be called honest. It becomes, indeed, painful to follow the stages in this rapid decay,—to find him reduced to writing "puffs" for tradesmen, to exhibiting himself in shop windows, and to introducing grand schemes to the public which was impossible to read without hearty laughter. A scandalous infatuation, too, was to be associated with his old age, which last excited the contempt pity of all who knew him. To the last he was full of schemes, devised with the fertility and roseate imagination of a Micawber; and to the last, unfortunately, he was devoted to pleasure. The result was a breaking up of his health, and even a decay of his faculties. When the war of 1870 broke out he was removed from Paris to Puyis, near Dieppe, and there affectionately attended by his son and daughter. He died on the 5th of December in the same year. He was even poorer than when he began the world; and the brilliant novelist, who had earned more than £1,000 a year, had hardly a sou left. On the 16th April 1872, when the war was over, his remains were removed to Villers-Cotterets, and interred in presence of the leading littérateurs of Paris.

The works that bear Dumas's name are said to amount to some 1200 volumes. His dialogue is often full of spirit and dramatic propriety—and this, too, in spite of the temptation, to a man paid by the line, to "spin out" his matter to the utmost extent. He left about sixty dramas, of which not more than three or four will be remembered, but two, the Marriage of Louis XIV, and
Mille de Belle Isle, belong to the repertoire of the Con(write number) French. These will always be listened to with delight. His most popular stories have been mentioned, but even now their unique expansion and compelling development, owing to the necessities of the feuilleton system, are found to be serious obstacles to their popularity.

He left a daughter, Madame Petel, who has written a few romances, and a son, the well-known "Alexandre Felis," who, unlike his father, has been distinguished by slow and careful work. He is best known of his romances La Dame aux Camelias, which has been translated in every language in which romances are written, and by a number of dramas which deal satirically with the characters, follies, and manners of society under the second empire (p. 5).

Dumas, Mathieu, Count (1753-1837), a French general and military historian, was born at Montpellier of a noble family, on the 23rd November 1753. He joined the army in 1774, and entered upon active service in 1780, as aide-de-camp to Rochambeau, commander-in-chief of the army sent to aid the Americans in their war against England. He had a share in all the principal engagements that occurred during a period of nearly two years. Shortly after the capture of Yorktown, in which he took part, he joined the expedition under Vaudreuil intended to make an attack on Jamaica. On the conclusion of peace with England in 1783 he returned to France, where he soon afterwards received his commission as major. In 1784 he was sent to explore the archipelago and the coasts of Turkey, a service in which he was engaged for two years, and which he performed with great thoroughness. He was present at the siege of Amsterdam in 1787, where he cooperated with the Dutch against the Prussians. At the Revolution he acted with Lafayette and the constitutional liberal party, whose aim was to effect a complete reform without abolishing monarchy. He was intrusted by the Assembly with the command of the escort which conducted Louis XVI to Paris from Varennes, where he had been arrested. In 1791 he was appointed to a command at Metz, where he rendered important service in improving the discipline of the troops, and in organizing the first battalion of horse artillery that was formed in France. Chosen a member of the Legislative Assembly in the same year by the department of Saine-et-Oise, he advocated firmness and eloquence the principles and policy of the constitutional party to which he belonged. In the following year he was elected president of the Assembly. When the extreme republicans gained the ascendancy, however, he became a minority man, and deserted the party to make his escape to England. Returning after a brief interval under the apprehension that his father-in-law would be held responsible for his absence, he arrived in Paris in the midst of the Reign of Terror, and fled to home to avoid the fate of his friends Barnave and Dupont Duteurtre. Soon after his return to France he was elected a member of the Council of Ancients. On the triumph of the extreme revolutionists in 1797, Dumas, being proscribed as a monarchist, made his escape to Holstein, where he enjoyed the hospitality of Count Stolberg. During this exile he wrote the first part of his Précis des Événements Militaires, which was published anonymously in monthly numbers at Hamburg in 1800. Recalled to his native country when Bonaparte became first consul, he declined the presidency of Bordeaux, preferring a military appointment. Intrusted with the organization of the army of reserve at Dijon, he was on the completion of the task appointed chief of the staff to that army. In 1801 he was nominated a councillor of state, and in the same year he was chosen to propose and defend in the Corps Législatif the formation of the Legion of Honour, of which order he afterwards (1810) became grand officer. Attached to the household of Joseph Bonaparte, Dumas went in 1806 to Naples, where he became minister of war. On the transfer of Joseph to the throne of Spain, and the accession of Murat to that of Naples, Dumas rejoined the French army, with which he served in Spain during the campaigns of 1809, and in Germany during that of 1813. After the Battle of Wagram, Dumas was employed in negotiating the armistice, and he was left by Napoleon at Vienna in order to superintend the evacuation of Austrian territory by the French troops. In the disastrous Russian expedition of 1812 he held the post of intendant-general of the army, which involved the charge of the entire administrative department. He shared the horrors of the retreat from Moscow, and the privations he suffered brought on a dangerous illness, from which, however, he recovered after a brief interval of repose at Dumas. Resuming his duties as intendant-general, he took part in the battles of Lutzen and Bautzen. When the decisive defeat of Leipzig occurred, Dumas, who was stationed with the besieged army in Dresden, was employed to negotiate the unavoidable capitulation, the terms of which, though agreed to by the opposing general, were not ratified by the allied sovereigns. Dumas, who had gone to report the matter to the emperor, was consequently arrested and imprisoned in Hungary until peace was concluded in 1814. On the accession of Louis XVIII, Dumas received several important commissions in connection with the administration of the army. He had the entire confidence of the king, and would have been appointed minister of marine but for the adverse influence of the party that had been in exile during the empire. When Napoleon returned from Elba, Dumas at first kept himself in retirement, but he was persuaded by Joseph Bonaparte to present himself to the emperor, who intrusted him with the task of organizing the National Guard. This brought him into disfavour with the Bourbons, and he was obliged to retire upon half-pay when Louis XVIII was restored to the throne. He devoted his leisure to the continuation of his Précis des Événements Militaires, of which nineteen volumes, embracing the history of the war from 1798 to the Peace of Tilsit in 1807, appeared between 1817 and 1826. A growing weakness of sight, ending in total blindness, prevented him from carrying the work further, but he translated Napoleon's History of the Peninsular War as a sort of continuation to it. In 1818 Dumas was restored to favour through the influence of Gouvion Saint-Cyr, and admitted a member of the Council of State. In 1828 he was chosen a deputy by the first arrondissement of Paris. After the revolution of 1830, in the events of which he took an active part, Dumas was created a peer of France, and re-entered the Council of State as president of the war committee. He died at Paris on the 16th October 1837."
DUMBARTON

The parishes of Cumbernauld and Kirkintilloch, belonging to Stirlingshire till the earl of Wigtoun, whose property it was, became heritage of Dumbartonshire and annexed it to this county, which, as a whole, contains 570 square miles, or 127,677 statute acres, and is divided into 15 parishes. The county is in a shape a crescent, having a convex coast-line of 35 miles, formed by the Clyde on the south for 15, and Loch Long on the west for 20 miles. Along its eastern side for a distance of 24 miles stretches Loch Lomond, the "queen of Scottish lakes," studded with small islands, which number 30 in all, and most of which, with about two-thirds of the shore, are in Dumbartonshire. There are other fresh-water lakes in the county, but they are of a minor description. The Gare Loch is an arm of the sea about six miles long by one broad, and forms with Loch Long the peninsula of Roseneath, nearly detaching it from the mainland. Besides the Clyde, the only river of any note which can be said to belong to this county is the Leven, which flows for six miles through a fine valley, joins the Clyde at Dumbarton Castle.

The mountainous districts are marked by numerous cascades and lesser streams, falling for the most part into Loch Lomond, of which the chief are the Falloch, Lomond, and Dumbarton rocks. The river Falloch, rising in the eastern border, drains the detached portion of the country. About two-thirds of Dumbartonshire are hilly and mountainous. The most elevated regions are in the west and north-west, between Loch Long and Loch Lomond, and to the north of Loch Lomond. The extreme north attains an elevation of 3000 feet, and Finnart, on Loch Long, is 2400 feet high. While this mountainous character prevails in the north of the county, in the eastern detached district and along the Clyde and the Leven it is lowland—marked, however, by the rising of abrupt eminences such as the hills of Kilpatrick and Cardross, and the rocks of Dumbarton and Dumbuck. In scenery it is unsurpassed in Scotland, not only for what it embraces but for the magnificent and extensive views which it commands. The climate varies with the character of the county, but is on the whole salubrious, though much more humid than in many parts of Scotland. The prevailing winds are from the west and south-west, but easterly winds are frequent in the spring months. Frosts are seldom severe, and, except on the mountains, snow never lies long. In the southern districts of the county Old Red Sandstone strata stretches from Rosneath to Loch Lomond, limestone is found in the higher grounds of Kilpatrick, Dumbarton, and Row; the hills of Dumbuck and Kilpatrick and Dumbarton Rock are composed of trap; while muca slate, quartz, and talc principally constitute its northern formations. Clay-slate is likewise found, and has been wrought with success at Luss, Camstradden, and Roseneath. Coal measures also exist, and there are pits for working coal in several districts. Ironstone is found in considerable quantities in connection with limestone in the parishes of Kirkintilloch and Cumbernauld.

The lands of Dumbartonshire, which extend chiefly along the Clyde and the Leven, and are composed of rich black soil, gravelly soil, and clay, are divided into farms ranging from 30 to 300 acres, and in some cases to 700 or 800 acres. From the proximity to Glasgow and other large towns, the farmers have the double advantage of good markets and a ready market for all kinds of both stock and produce, and, under the stimulus of this, great progress has been made. Special attention has been given to the construction of farm buildings, the erection of fences, and the use of proper drainage, as well as to the rearing of cattle and the management of sheep stock, principally the Ayrshire breed. Black-faced sheep and black cattle are pastured on the hilly lands, and Cheviot sheep and Ayrshire stock on the low grounds. In 1876 Dumbartonshire had 1717 horses, 15,183 cattle, 71,202 sheep, and 11,511 pigs. Oats and wheat are grown in quantities; large crops of potatoes are raised; turnips, barley, and beans are also grown. In 1876 there were 9862 acres under corn crops, of which 7350 were under oats and 1149 under wheat, while 4443 under green crops. On the banks and islands of Loch Lomond there are some yew trees of large size, and evidently of a very great age. There are few large estates in the county; the largest being Rossdhu (Sir James Colquhoun, Bart.), 67,041 acres, Strathleven (Mrs. Ewing), 9180, Roseneath (duke of Argyll), 6798, and Cumbernauld (Hon. Cornwallis Fleming), 3593. The whole number of landowners having one acre and upwards is 706, possessing 152,968 acres, of the annual value of £251,134.

The banks of the Leven, whose waters as well as being constant are singularly soft and pure, have long been celebrated for their bleachings of cotton, dyeworks, and print-works. Bleaching was carried on in the Vale of Leven upwards of 150 years ago. The printing of cotton began at Levenfield in 1788, and has for some time been the chief manufacturing industry in Dumbartonshire. There are extensive ship-building yards, engine-works, foundries, tanneries, and breweries. At Dalmuir extensive works for the repair of the dredging plant belonging to the Clyde Trust were erected by the trustees in 1867, costing £25,000. A large patent ship for taking on the dressers used on the Clyde forms part of these works, at which three steam forges-hammers are in constant operation. In 1850 a line of railway, already completed from Bowling to Dumbarton, was extended up the Vale of Leven to Dalloch. In 1838 the Glasgow railway to Helsinburgh was opened, running through Bowling, Dumbarton, and Cardross, and, with the steam communication on the Clyde and the lochs, abundant facilities for every kind of traffic to all parts of the county. The Forth and Clyde Canal, begun in 1768 and opened for traffic in 1775, passes through Dumbartonshire for more than 18 miles, and is carried over the valley of the Kelvin by an aqueduct. At Bowling there is a harbour with quays, forming a tidal basin of 7½ acres. The county is somewhat rich in antiquities, connected both with the period of the Roman occupation and with that of the aboriginal inhabitants of Scotland. The wall of Antoninus runs along the north of the eastern part and through the south-east corner of the main district to Kilpatrick. Remains of Roman workmanship have been found at Duntocher and in the parish of Cumbernauld, as well as at the castle. The Caledonians, Picts, &c., are commemorated by rude forts and tumuli here and there; and there are several remains of old baronial castles. Rob Roy's district lies to the north; the clans had encounters in Glenfinnan; and the county is associated with the heroic Wallace and Bruce, the latter having built a residence at Cardross, in which he died. In 1815, Henry Bell, from whose designs the first steamer built...
on the Clyde, "the Comet," was constructed, and who indeed was the first to put into operation the idea of employing steam for navigation purposes, lived at Helensburgh, where he died in 1830. A monument to him was erected near Bowling. The celebrated ship-building firm of Napper & Sons had its origin in a smith's foundry business at Dumbarton.

Several important watering-places, including Helensburgh, Kilcreggan, Rosneath, &c., are situated in Dumbartonshire. The other principal towns and villages are Kirkintilloch, Alexandria, Dunosher, Bonhill, Renton, Kilgrinburn, Kilpatrick, Cardross. The leading gentlemen's seats are Rosslau (Sir James Colquhoun, Bart.), Rosneath, (duke of Argyle), Garcube House (Sir George Campbell), Tillichowan Castle (J. Campbell), Bonhill Castle, and Shandon (now a hydro pathetic establishment), built by the late Robert Napper.


Dumbarton, a royal parliamentary and municipal burgh and seaport-town of Scotland, capital of Dumbartonshire, is situated at the confluence of the rivers Clyde and Leven, 14 miles north-west from Glasgow. It is a very ancient place, and is said to have been once the capital of a kingdom of the Britons in the vale of the Clyde Alcluhy, "the rock upon the Clyde," was the name of this ancient capital of the Britons, but whether it was situated on the site of the present town, or confined within the precincts of the castle, cannot be exactly ascertained. The site had previously been used as a naval station by the Romans, who called it Theodisma. At a subsequent period, Dumbarton was the capital of the earldom of Lennox, but was given up by Earl Maldwyn to Alexander II, by whom it was erected into a royal burgh in the year 1221, and declared to be free of all imposts and burgh taxes. It afterwards received other charters from succeeding monarchs, and finally it obtained a confirmation of the whole from James VI. Among other privileges conferred was that of levying customs and dues on all vessels on the Clyde from the Kevern to the head of Loch Long, and ships within these bounds had to pay duties at Dumbarton. Offers dues on foreign vessels coming into the Clyde were also levied. In 1700 these rights were transferred to Glasgow by a contract, but were subsequently vested in a special trust created by successive Acts of Parliament. The town is principally built upon the eastern bank of the Leven, which almost encircles it, and is chiefly composed of one main street running in a semicircular form round the head or west end of the peninsula and parallel to the river. A good stone bridge of five arches, 300 feet long, connects the town with Bridgeend, a suburb on the western side of the Leven. The waters of the Leven form the harbour. For seventy years the staple trade of Dumbarton was the manufacture of crown glass, commenced in 1777 and discontinued after the abolition of the glass duty. As many as 300 hands were employed in the business. But for many years its principal trade has been ship-building, and particularly the construction of iron steamers. By the natural port of the Clyde, Dumbarton has the distinction of originating in Britain the formation of steam navigation companies. In 1815 a joint-stock company was formed in Dumbarton to run a steamer from that town to Glasgow, and their steamer, the "Duke of Wellington," was built by McIachlan in Dumbarton. The next steamer was built by William Denny in 1820, from which date the ship building of the town may be said to have started. But it was not till 1844, on the application of iron to the purposes of ship-building, that the trade assumed the important proportions to which it was raised by the firm of Denny and by others. The Dennyqunt Forge Company, which is amongst the largest and most unique in Great Britain, both as respects the building itself and the machinery employed, was opened in 1855. Extensive harbour improvements were entered upon in 1852, and successfully carried out. In 1874 the total tonnage of iron vessels launched in Dumbarton amounted to 32,000 tons, in 1870 to 37,000, in 1876 to 17,500. Some of the vessels built in Dumbarton are among the most magnificent employed in the British trade. The General Police Act has been in operation in Dumbarton since 1855. In 1857 the sanction of Parliament was obtained to a bill for extending the municipal boundaries so as to include West Bridgeford. The embankment of the Broad Meadow, a project which had been entertained for 200 years, was accomplished in 1859, securing for the town a considerable tract of agricultural land and 20 acres of recreation ground. Since 1860 the burgh has been supplied with water drawn from the Long Craggs. A fine cemetery, a mile from the town, was formed in 1854, and the old Dumbarton parish churchyard has been closed by authority since 1856.

The disadvantage Dumbarton long laboured under of having access to the river steamers merely by ferry boats is now obviated by a pier recently constructed from the foot of Dumbarton Rock, at a cost of from £4000 to £5000.

The situation of Dumbarton Castle is eminently picturesque. The battlements of the fort are perched on the summit of a rocky mount, shooting up to the height of 206 feet sheer out of the alluvial plain on the east side of the mouth of the river Leven. To the east of the castle there are rocky eminences on the verge of the Clyde, of a similar form, though less isolated. The Rock of Dumbarton measures a mile in circumference at the base. It diminishes in breadth near the top, which is divided into two summits of different heights. The rock is basaltic, and has a tendency to columnar formation. Some parts of it have a magnetic quality. The fortress, naturally strong, possesses several batteries, which command a very extensive range. According to a provision in the Treaty of Union, the defences are kept in constant repair, and a garrison is maintained in the castle.

The affairs of the burgh are managed by a provost, 2 bailies, and 16 councillors, to whom are added the provost, the bailies, and the council, and borough buildings are good. Dumbarton joins with Port Glasgow, Renfrew, Rutherglen, and Kilmarnock in returning a member to Parliament. In 1871 the population amounted to 11,401.

DUMDUUM, or DUMDA, a town and canton in British India, at the head of an administrative subdivision in the district of the Twenty-four Pergamains, in the presidency of Bengal, with a station on the Eastern Bengal railway, 41 miles N.E. of Calcutta, in 22° 37' 53' N. lat. and 84° 26' 1" E. long. It was the head-quarters of the Bengal artillery from 1783 to 1853, when they were transferred to Meerut as a more central station, and its possession of a cannon foundry and a percussion-cap factory procured for it the half jocular name of the Woolwich of India. The barracks—still occupied by small detachments—are brick-built and commodious, and among the other buildings are St Stephen's Protestant church, a Roman Catholic chapel, a European and native hospital, a large bazaar, and an English school. The population in 1871 amounted to 5173, of whom 1201 were Mahometans, 1053 Christians, and 2556 Hindus. The males numbered 3414, the females 1765. It was at Dumduum that the treaty of 1757 was signed, by which the nawab of Bengalred the privileges of the English, allowed Calcutta to be fortified and bestowed freedom of trade, and in 1857 it was the scene of the first open resistence of the sepoys to the use of greased cartridges.
DUMFRIES, one of the three Scottish border counties, lies in an elliptical form on the north side of the Solway Firth, its other boundaries being from Lanark, Peebles, and Selkirk on the N., Roxburgh on the E., Ayr and Kirkcudbright on the W., and Cumberland on the S. Its greatest length is fully 50 miles, its breadth 33, its circumference 190, and the area is 1103 square miles or 720,205 acres. The coast-line on the Solway measures 21 miles. Towards this end the county slopes down from a high mountain range, by which it is cinctured on the north, the intermediate pace being extremely irregular, lofty hills alternating with wide stretches of table land or rich fertile holms, and in other instances the surface looking like a vast undulating mass that by some natural process had suddenly become fixed and rigid. Among the leading features of the county are the three dales by which it is cleft from north to south, and through which run the rivers that give name to them, the Nith, Annan, and Esk. Over-looking these rise numerous elevations, the highest being Whitecoomb in the east, 2651 feet; Hartfell in the north, 2561 feet; Queensberry, also in the north, 2285 feet, which gives to the duke of Buccleuch his secondary title, and the title of marquis to a branch of the house of Douglas; and Etrick Pen, 2659 feet, the latter standing sentinel over an extensive district. The Nith is the chief river of the county. Starting from its mountain cradle near Dalvelloch, in Ayrshire, it takes a south-westerly sweep, watering the old burgh of Sanquhar, at the head of Nithsdale, and further down the modern village of Thornhill, near which stands the ducal castle of Drumlanrig. As the river proceeds it passes on the one hand Dalwallan, where Patrick Miller made his first fruitful experiments in steam navigation, and on the other the acres of Elibank, which Robert Burns turned over with his plough. At Auldghirch Bridge, near Blackwood, the dale narrows considerably, then it expands till around and below the burgh of Dumfries it appears as a spacious plain, with gentle acclivities or bold elevations rising on every side. The Nith is swelled by numerous streams at various stages, its latest and largest acquisition being the Cluden, the confluence taking place about a mile above Dumfries, and the absorbing river reaching the Solway about eight miles below that burgh, its whole course measuring about 50 miles. An upland spot, where the counties of Lanark, Peebles, and Dumfries converge, gives birth to three streams, according to the popular saying, "Annan, Tweed, and Clyde, All arise from one hillock." The first-named river, after a rapid course from its highland source, five miles above Moffat, receives several tributaries a little south of that town, then proceeds at a leisurely pace down the dale, which, narrowed at first by rocks or ridges, expands into a fertile basin termed the "Howe of Annandale," studded with hamlets and spangled by the MIME Inelock of Lochmaben,—that venerable royal burgh, which claims to have been the birth-place of King Robert Bruce, and the prosperous town of Lockerbie occupying conspicuous places on the western and eastern banks, other rivulets, including the Dryfe (flowing past the scene of a fierce clan battle fought between the Maxwells and Johnstones in 1675), giving increased volume to the stream below Bruce's burgh, the valley narrowing again as the water grows wider and deeper. When little more than a mile from the sea it passes Annan, the second town in the county, its entire length being nearly 40 miles. During about a mile of its course the Esk divides Dumfries and Galloway into its two prongs, the eastern being from Selkirkshire frontier it flows southward past the baronial town of Langholm, and, after being a Scottish stream to the extent of 30 miles, it enters English ground, waters Longtown, describes a westward curve, and then falls like its two sister streams into the Solway, its entire course extending to about 40 miles. Besides the lakes in Annandale already referred to, Loch Skene, lying under the shadow of Whitecoomb hill, 1303 feet above sea-level, is the only one of consequence, its water finds an outlet by leaping over a rocky height of 300 feet, forming a cascade termed the Gray Mare's Tail. Another small but exceedingly picturesque waterfall in Morton parish is called Cruchgo Linn. The chief mineral waters of the county are those of the well at Moffat, and another about five miles distant, called Hartfell Spa, situated in a cleft of the hill from which it takes its name. The former are reckoned beneficial for chronic gout, rheumatism, and liver complaints; and the latter acts as a mild astringent and powerful tonic. Owng to the great repute of these waters, and the romantic scenery of the surrounding district, Moffat during summer and early autumn becomes a favourite and fashionable place of resort. A small chalybeate at Brow, on the Solway, possesses considerable virtue, and is rendered interesting from the circumstance that it was partaken of by Burns during his last illness, though without avail. Generally speaking the climate is mild and salubrious, with a mean temperature of 53° Fahr.; the average rainfall supplying sometimes more than enough of moisture. The soils are chiefly gravel or sandy loam and clay, except where river and estuary have formed rich alluvial tracts. At no very distant date it was roughly computed that there were 80 square miles of arable land lying along the sea coast, 232 miles chiefly upland, and 98 miles mountainous, yielding nothing but heather and game, but by the application of bone manure, draining, planting, and green crop husbandry, all this is changed, no fewer than 213,784 acres being under the plough—even the huge expanse of Lochmoss, lying in the parishes of Tinwald, Dumfries, and Torthorwald, becoming by degrees less of a drawback to the agricultural enterprise of its proprietors, though much of the surface of the county still wears a pastoral aspect drawn from one of its chief rural industries, sheep-breeding. In 1876 there were 49,975 acres under corn crops, of which 45,292 were oats and 546 wheat; 25,669 were under turnips, 3,323 miles chiefly upland, and 988 miles mountainous. In 1875 there were 14,060 acres of meadow land, of which 8,649 were grass under rotation. These figures differ little from those for 1873, except that 1291 acres were then in wheat. With abundance of coal at the two extremities—Sanquhar and Canonbie; with limestone at Kilhead, Closeburn, and Bacjarg; with lead mines at Wanlockhead, the produce of which when undergoing refinement yields a large percentage of silver; with gold dust and even nuggets of that metal in the same district, but now no longer searched for systematically, as they were with considerable success in the 16th and 17th centuries; with sandstone quarries in various quarters; with woolen mills at Langholm; with numerous manufactures centring in the county town; with some little sea-borne traffic; and with good salmon fisheries in the Nith, along the Carlawcock shore, and at Annan Water-Foot on the Solway,—the county itself is still essentially an agricultural one, and as such it takes high rank. Early in the 15th century the district breeders of Galloway cattle began to send stock to the south; and, before the current century was far advanced, some 15,000 head of heavy cattle were annually driven from Dumfriesshire and Galloway to the English markets. Forty years ago the number had increased to 20,000, their value on an average being at least £200,000. For some years past Ayrshire dairy cattle and shorthorns have superseded the old stock on most farms of the county, and its trade in live stock generally has considerably decreased. Few store cattle are...
The sheep trade of Dumfries is of comparatively recent origin, is now of great extent. Cheviot predominates, the frugal, black-faced breed still occupying the higher sheep walks, while half-bred lambs, the produce of Cheviot ewes crossed by Leicester or other long-wooled rams, are fattened on the richer pastures yielded by low-lying farms, supplemented by turnips in winter, and are thus made ready for the butcher when fifteen months old. For nearly a hundred years pig-rearing has occupied a place in the rural economy of the county. A sum of £50,000 represented an annual trade in pork about sixty years ago. Influenced by large imports of bacon from America, the curing of ocears has of late decreased. In 1876 the number sold in the public markets of the county was under 8000, the value of which, allowing for those disposed off privately, would not exceed £45,000, a few years back the annual value ran from £70,000 to £75,000. As regards quality and flavour, the Dumfries ham still maintains the high character they have long held in the English markets.

Three leading highways, one in each valley, with numerous branch roads, intersect the county. It possesses also ample railway communication,—the Glasgow and South-Western line, completed in 1850, extending through Nithsdale and Lower Annandale, and, soon after passing Gretna Green (famous in days of yore for its matrimonial celebrations), crossing the little border river Sark, and the Caledonian line, completed in 1849, traversing Moffatdale and Upper Annandale, and also a portion of England as far as Carlisle.

In a Parliamentary Blue Book (1874) the acreage of the county is given at 676,071, and its yearly value (1872) at £955,511, 17s., the owners numbering 4177, of whom 886 possessed more than one acre each, the value per acre being 17s. 7d. as compared with 20s. for all Scotland. From the valuation roll for 1876 we learn that the chief proprietor, the duke of Buccleuch and Queensberry, owns 253,514 acres, yielding an annual revenue of £57,810. The names of other leading proprietors, with their extent of land and incomes from it, are,—Mr. J. J. Hope Johnstone of Annandale, £4,070 acres, with a rental of £58,684, earl of Mansfield, 14,342 acres, £15,938, marquis of Queensberry, 13,243, £13,982, Mr Villiers and Viscountess Cole of Closeburn, 1,360, £11,658, Sir J. J. Hope Johnstone of Closeburn, 1,360, £11,658.

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A few of the principal firms are those of Walter Scott and Sons, owners of 370,000 acres, and of the best in Scotland, and next to those of Hawick in extent. Prior to 1817, however, the prosperity of Dumfries depended much on its position as the capital of a rich rural district, which it still is, but soon after that date it began to bulk largely as a manufacturing town in connection with the tweed trade, and to its development the growth of the burgh in size and importance is principally due. The principal firm, that of Walter Scott and Sons, usually employs about 1400 workers, with 400 looms and 30,000 spindles. Nearly all the business traffic of and from Dumfries is now carried on by rail, the vessels belonging to the port numbering only two or three, and its revenue—burdened by heavy interest on a sum borrowed to erect a large sea-dyke, which has been of little benefit—is insufficient to cover the expenditure.

The origin of two places of worship in connection with the Established Church (St Mary's and Greyfriars) is noticed below, a third, St Michael's, is a stately mansion in the form of droveldale mansions, British motives and camps, Roman roads and camps, Anglo-Saxon relics, the chief of the latter being the Runic monument at Ruthwell, which tells the story of the cross in characters as old as the days of the Heptarchy. As the county is also dotted with "chilled castles breathing stern march," and other time-worn tokens of bye-gone ages, it presents a rich call for archaeological research.

Dumfries, beautifully situated on the left bank of the Nith, about eight miles from the Solway Firth, is the capital of the county just described.

The irregular yet decided progress of the town can be traced through the Middle Ages, and more recently till our own day, when it wears an attractive and flourishing aspect. A serious check was given to its prosperity by a visitation of cholera, which cut off more than 500 of its inhabitants in 1832. Since a copious supply of good water was obtained from a neighbouring loch, and other sanitary improvements were introduced, the salubrity of the burgh has been fairly established, and its size and trade—promoted also by its railway intercourse and the establishment of the tweed manufacture—have greatly increased. Few Scotch provincial towns have gone forward with such a gigantic stride during the last thirty years, and its steps in advance have been especially remarkable during the latter half of that period, as shown chiefly by the bundle of its business streets, the formation of new thoroughfares, and the numerous suburban villas which now envelop the old burgh proper.

From time immemorial the town has possessed a great weekly cattle market, which, though reduced since 1848 by the establishment of competing markets, and the substitution of sheep for cattle on many surrounding farms, is still second to none on the north side of the border. The average number of cattle sold on the Sands during five years ending 1872 was nearly 14,000 yearly, in 1876 the number was 18,413, besides 6844 sold at the auction marts. Vast herds are also sent direct south from the railway station. A still larger trade is now done in sheep, the average number offered for sale during five years ending 1872 being 37,000, while 29,980 were sold at market in 1876, and 42,958 by auction. There is also a weekly market for pork, beginning in November and ending about the end of March.

Among the special industries of Dumfries, clog-making and basket-making have long occupied an important place, their traffic in timber has grown to be immense, a hundred acres of nursery ground help to beautify the town, and supply material for an extensive trade in seeds, flowers, and other plants; the conscious skill in holes and leather gives labour to about 150 hands, while nearly the same number are engaged at iron works. More extensive than any of these is the hosiery manufacture, which, dating a century back, now gives employment to about 450 hands (including warehousemen), the goods produced ranking as the best in Scotland, and next to those of Hawick in extent.

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The origin of two places of worship in connection with the Established Church (St Mary's and Greyfriars) is noticed below, a third, St Michael's, is a stately mansion...
DUMFRIES
dating from 1746. Before the lower interior was rescaled in 1869, it contained a pew which Burns and his family occupied. The poet's remains are to be found in a magnificent mausoleum in the surrounding churchyard; and besides this paramount distinction the cemetery is richer with monumental erections than that of any other provincial town in the United Kingdom. Among the other ecclesiastical buildings are three Free churches, three belonging to the United Free Presbyterians, two to the Congregationalists, one to the Wesleyan, the Scottish Episcopal, the Catholic Apostolic, and the Roman Catholic, while two other denominations—the Baptists and Evangelical Union—are also represented. Dumfries has three newspapers, two of them published twice a week and one weekly. It has long been able to boast of a well-equipped grammar-school—the Academy. The town possesses its full share of benevolent institutions. Its oldest one, Moorhead's Hospital, erected in 1753, gives accommodation to decayed householders. A hospital for the reception of persons suffering from Hansen's disease has been in existence since 1776, under the name of the Dumfriesshire and Galloway Royal Infirmary, but the building now used as such, an imposing edifice in the Northern Italian style, was only opened a few years back; 398 patients were treated in 1876, at a total outlay of £2137. Crowning an eminence situated a little to the south of the town stands a noble building resembling a Greek cross; this is the Crichton Royal Institution for lunatics, due to the munificence of Dr James Crichton of Frasers' Carse, whose bequest of £100,000 was applied in erecting and partly endowing the asylum. Since it was opened, nearly forty years ago, it has been, considerably enlarged, and also supplemented (in 1845) by the Southern Counties' Asylum for pauper inmates chiefly; usually the patients number about 500, nearly a third, as middle and upper class patients, being housed in the older portion of the establishment. The old infirmary building is now used as a commercial academy connected with the Marist Brotherhood, and dedicated to St Joseph. In it about 70 youths receive education; belonging to the establishment there is a novitiate adjoining the Roman Catholic chapel, where 14 members of the order are under training for missionary service at home or abroad. Several of the banking establishments possess a fine appearance, but the county buildings in Buccleuch Street (Scotch Baronial in design), Greyfriars' Church fronting the head of High Street (Pointed Gothic), and the new infirmary are the most imposing edifices within the burgh. It has a theatre royal, opened in 1792, which was almost entirely reconstructed at a cost of £2000 in 1876, and its interior is now, site considered, as handsome as that of any similar place of entertainment throughout the kingdom. There is no object in the town that can vie with Devorgilla's Bridge as regards archaeological interest. Built of stone about 1280, it had no equal at that period in Scotland, though the popular story which assigns to it thirteen arches is belied by indisputable documents which show that they never numbered more than nine. A second stone bridge was built in 1733–5, at an expense of about £5000; and a small iron foot bridge, which cost nearly £2000, was opened on the closing day of 1875. The associations of Dumfries with Burns, however, and the memorials it possesses of the national bard, draw to it more travellers annually than all its other attractions—seaside, antiquarian, or social.

The town council consists of 25 members, including a provost, 3 bailies, a dean of guild, and a treasurer. Four other royal burghs combine to form a parliamentary constituency with Dumfries, namely, Annan, Kirkcudbright, Sanquhar, and Thornhill. Cheese. The Five Carlins of Dumfries's ballads, being represented by one member. In 1861 the population within the royalty was 15,347; in 1871 it had increased to 15,704. As a parliamentary borough Dumfries includes a large portion of the Nith, its population as such amounting in 1871 to 8,826.

History—The precise circumstances of the origin of Dumfries are not imperfectly known; but the first fortlet built by the Selgovian Britons formed the nucleus of the town, an hypothesis that is supported by its name, which, according to Calvins, means "beyond the Enclosure." On the castle and town are many curious monuments. The oldest existing charter is one granted by Robert I., dated 1095. Male a royal burgh by William the Lion, Dumfries thereby acquired important privileges; and another stimulus to its prosperity was supplied when Devorgilla, daughter of Alen, Lord of Galloway, connected that province with the town by building a stone bridge over the Nith. It was the son of that munificent lady, John Balliol, whom Edward I. of England selected as heir to the Scott all throne from the numerous competitors for it who placed their claims at his disposal. During the troubles that ensued, Nithsdale and Galloway supported Balliol, and or his withdrawal from public life they for the most part preserved the possessions of the castle and town, and established a new barony in the person of the young Pretender, who, converting the Nithdale and Galloway supported Balliol, and or his withdrawal from public life they for the most part preserved the possessions of the castle and town, and established a new barony in the person of the young Pretender, who, converting the

When the Union with England was under debate, the provost of Dumfries, as its representative in the Scottish Parliament, voted against the measure; and the Arts of Union were publicly burned (Nov. 20, 1706) by a party of Cameronians at the market cross, with the enthusiastic approval of the populace. About some days afterwards the habitants were invited to visit from Viscount Kenmure, but they manifestly such a bold front that the Jacobite chief acted on Falstaff's maxim, "Dissent is the better part of valor." Less vigorous and less than a week of the rebellion, they allowed the town to be peacefully occupied by the young Pretender, who, conveying No 5 of theinent now as the Commercial Hotel into a little palace, was there for three days towards the close of December 1745. In order at once to recruit his own exchequer and punish the luggies for their pretensions to the house of Hanover, the prince demands £2000 in money; also 1000 pairs of shoes for his kicked followers, whose footgear had nearly vanished during their forlorn journey from the south; and, if he had been de facto king, he stayed the
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DUMONT, JEAN, a well-known publicist, was born in France in the 17th century, the precise date being unknown. He followed the profession of arms, but, not obtaining promotion so rapidly as he expected, he quitted the service and travelled through different parts of Europe. He stopped in Holland with the intention of there publishing an account of his travels. But in the interval, at the request of his bookseller, he wrote and published several pamphlets, which were eagerly bought after, owing to the unceremonious manner in which he treated the ministry of France. Thus freedom having deprived him of all hope of employment in his own country, he thought of forming a permanent establishment in that where he resided, and accordingly commenced a course of lectures on public law. The project succeeded far beyond his expectations, and some useful compilations which he published about the same period made him favourably known in other countries. The emperor appointed him his historiographer, and some time afterwards conferred on him the title of Baron de Carlseroon. He died at Vienna in 1726, at an advanced age. Dumont wrote with facility, but his style is deficient in vigour and correctness; his works, however, contain a great number of documents valuable for history.


In the summer of 1726, that season of promise and of hope, especially to a Genevian exile, Dumont suspended his labours in England in order to proceed to Paris along with his friend Durovren, ex-attorney-general of the republic of Geneva. The object of the journey was to obtain through Necker, who had just returned to office, an unrestricted restoration of Genevan liberty, by canceling the treaty of guarantee between France and Switzerland, which prevented the republic from enacting new laws without the consent of the parties to that treaty. The negotiations and proceedings to which this mission gave rise necessarily brought Dumont into connection with most of the leading men in the Constituent Assembly, and made him an interested spectator, sometimes even a participant, indirectly, in the events of the French Revolution.
The same cause also led him to renew his acquaintance with Mirabeau, whom he found occupied with his duties as a deputy, and with the composition of his journal, the *Courrier de Provence*, in which he was assisted by Durovrat, Clavière, and other Genevese patriots. For a time Dumont took an active and very efficient part in the conduct of this journal, supplying it with reports as well as original articles, and also furnishing Mirabeau with speeches to be delivered or rather read in the assembly, as related in his highly instructive and interesting posthumous work entitled "Souvenirs sur Mirabeau" (1833). In fact his friend George Wilson used to relate that one day, when they were dining together at a *table d'hôte* at Versailles, he saw Dumont engaged in writing the most celebrated paragraph of Mirabeau's address to the king for the removal of the troops. He also reported such of Mirabeau's speeches as he did not write, embellishing them from his own stores, which were inexhaustible. But this co-operation, so valuable for Mirabeau, and so self-devoted on the part of Dumont, was destined soon to come to an end; for, being attacked in pamphlets as one of Mirabeau's writers, he felt hurt at the notoriety thus given to his name in connection with a man occupying Mirabeau's peculiar position, and resolved to return to England, which he accordingly did in 1791.

In the eventful years which followed he continued to live chiefly at Lansdowne House, or at Bowood, where the most remarkable men of Europe were frequent guests. Latterly, he formed an intimate friendship with Lord Holland, whom he had known from childhood; and he became a member of the society of familiar friends, the habitual visitors at Holland House, where, during many years, celebrated guests were welcomed of every country, party, religion, and of every liberal profession or station. In 1801 Dumont travelled over various parts of Europe with Lord Henry Petty, afterwards marquis of Lansdowne, and brought back a fresh acquaintance with the mental occupations of the Continental nations, from whom England had for years been widely separated. But Dumont had then opened a new course of more serious occupations, in the editorship of the works of Bentham already mentioned. In 1801 he published the *Traité de la Législation*, the first fruits of his zealous labours to give order, clearness, and vivacity to the profound and original meditations of Bentham, hitherto praised only by a very few patient readers, and but little better known, even by name, to the English than to the European public. In 1814 the restoration of Geneva to independence induced Dumont to return to his native place, and he soon became at once the leader and ornament of the supreme council. He devoted particular attention to the judicial and penal systems of his native state, and many improvements on both are due to him. At the time of his death, he was on the eve of proposing a complete code of law, by which he fondly hoped to make the legislation of Geneva an example to Europe. He died at Milan when on an autumn tour of relaxation in October 1833, in the seventy-first year of his age.

DUMONT D'URVILLE, JULIÉ SÉBASTIEN CÉSAR (1790-1842), a French navigator, born in the town of Condat-sur-Norneau, in Normandy. The death of his father, who before the revolution had held a judicial post in Condat, devolved the care of his education on his mother and his maternal uncle, the Abbé De Croustiles. Failing to pass the entrance examination for the École Polytechnique, he went to sea in 1807 as a *scotte* on board the "Aquilon," and soon attracted the attention of the captain, Maignon, by his studious disposition. During the next twelve years he made his profession in his profession, and through all its multitudinous vicissitudes to increase his scientific and linguistic acquisitions: botany, entomology, English, German, Spanish, Italian, and even Hebrew and Greek were added to the more professional branches. In 1820, while engaged in a survey of the Mediterranean under Captain Gauthier of the "Chevrette," he was fortunate enough to recognize the Venus of Milo in a Greek statue recently unearthed, and to secure its preservation by the report he presented to the French ambassador at Constantinople. A wider field for his energies was furnished in 1822 by the exploring expedition of the "Coquille," under the command of his friend Duperrey; and on its return in 1823 his services were rewarded by promotion to the rank of *captaine de frégate*, and he was intrusted with the control of a similar enterprise. The "Astronome," as he now named the "Coquille," left Toulon on April 25, 1826, and reached Marseilles again on 25th of March 1829,—having traversed the South Atlantic, coasted the Australian continent from King George's Sound to Port Jackson, laid down various parts of New Zealand, and visited the Fiji Islands, the Loyalty Islands, New Caledonia, New Guinea, Amboyna, Van Diemen's Land, the Caroline Islands, Cebes, and Mauritius. Promotion to the rank of *captaine de vaisseau* was bestowed on the commander in August 1829; and in August of the following year he was charged with the delicate task of conveying the exiled King Charles X. to England. His project to undertake a voyage of discovery to the south polar regions was discouraged by Arago and others, who criticised the work of the previous expedition in no measured terms; but at last, in 1837, all difficulties were surmounted, and on 7th September he set sail from Toulon with the "Astronome" and its convoy "La Zélée." On 15th January 1838 they sighted the Antarctic ice, and after their progress southwards was blocked by ice, he proceeded to a continuous bank, which they vainly coasted for 300 miles to the east. Returning westward they visited the South Orkney Islands and part of the New Shetlands, and discovered Joinville Island and Louis Philippe's Land, but were compelled by scarcity of provisions to seek succour at Talcahuano in Chili. There they proceeded across the Pacific and through the Asiatic archipelago, visiting among others the Fiji and the Solomons, coasting New Guinea, and circumnavigating Borneo. In 1840, leaving their sick at Hobart Town, Tasmania, they returned to the Antarctic region, and on the 21st of March found the discovery of Adelie Land, in 140° E. of Greenwich. The 6th of November found them at Toulon. D'Urville was at once appointed rear-admiral, and in 1841 he received the gold medal of the Société de Géographie. On the 8th of May 1843 he was killed along with his wife and son in a railway accident near Meudon. Though many of his observations are no longer regarded as trustworthy on account of the defective character of the instruments employed, he made many important additions to various departments of scientific geography; and his natural history collections were especially valuable. His principal works are—*Enum. plantarum quas in samula Archipel. aut tertioribus Pont. Eurasii, ac, 1822; the Histoire du voyage (5 vols. of the 22) in the great work on the "Astronome" expedition in 1826-1829; the first part of the Histoire du voyage (10 vols. of the 22) in the series devoted to the expedition from 1837 to 1840; Voyages autour du Monde: résumé général des voyages de Mésdaglan, &c., 1833, 1844, &c.*


DUMOZIEZ, CHARLES FRANÇOIS (1739-1823), general of the French republican army, was born at Cambrai in 1739 of a respectable provincial family. His father was a commissary of the royal army, and had acquired some celebrity as a poet; from him young Dumoziez received his earliest instructions. His studies were con-
In 1757, and a public audience which he addressed in the Duc de Choiseul's suite, urging him to realize the cause of the Corsicans against the Genoese, and to arrange a public subscription which he had with the munition on the subject led to a violent altercation, the result of which was a lettre de cachet which forced Dumouriez to leave France. But the expedition which he had advised being afterwards resolved on, Choiseul made him an honourable public reparation, and appointed him quartermaster-general of the troops.

On his return from a pelegrinage tour in Italy, he addressed a memorial to the Duc de Choiseul, urging him to realize the cause of the Corsicans against the Genoese, and to arrange a public subscription which he had with the munition on the subject led to a violent altercation, the result of which was a lettre de cachet which forced Dumouriez to leave France. But the expedition which he had advised being afterwards resolved on, Choiseul made him an honourable public reparation, and appointed him quartermaster-general of the troops.

The political conjuncture of the times offered an unlimited scope for his fertility in diplomatic expedience, and he mingled in all the intrigues of the age. In 1770 he was sent on a secret mission to Poland with the view of neutralizing the efforts of Catherine II., and succeeded in securing fifty senators for the cause of independence, effected a unity of action among the confederates, and disciplined a militia; but, when there was some appearance of the resurrection of Poland being effected, Choiseul lost his place, owing to the machinations of the Duc d'Aiguillon and Madame Du Barry, and Dumouriez was recalled to Paris. He was soon, however, sent back on a similar mission by D'Aiguillon. He endeavoured to assist the revolutionary party in Sweden, and to raise troops in the Hanover towns to menace Stockholm, but this was contrary to the views of the French cabinet, and the Duc d'Aiguillon, having discovered his project, had him arrested and imprisoned in the Bastille for six months. He was afterwards sent to the castle of Caen, from which he was not released until the accession of Louis XVI.

Dumouriez had naturally little inclination to resume the connection with foreign politics which had proved so dangerous, and he accordingly devoted his attention to the internal economy of his own country. He wrote a memoir on the great importance that might be given to the harbour of Chellesburg, one result of which was that he was appointed governor of the place in 1778.

In 1788 Dumouriez was promoted to the rank of major-general. When the revolutionary movement began he pronounced in favour of political reform without breaking with the court. The connections which he held with the leading men of the Girondists greatly advanced his political career. At the opening of the second legislative assembly he was appointed minister for foreign affairs in place of Tollesart, but he held the position for only three months. During his short tenure of office he exerted himself to the utmost in reforming abuses, and in introducing the greatest economy into every department. He held for one month the office of minister of war after the dismissal of his colleagues Poland, Servan, and Chaillot. At length his own resignation followed, which increased his popularity. When the troops of the coalition advanced against France, he was appointed to the command of the army of the north as lieutenant-general under Marshal Lorrain. He made a determined stand against the advance of the Allies, which was decisively checked by the defeat inflicted on them at Valmy on the 20th September 1792. This was followed by a campaign in the Austrian Netherlands, in which Dumouriez was uniformly successful, until he was singularly defeated by Coburg in the battle of Novaeham in January 1793. The execution of Louis had estranged him from the republican party, and, when im consequence of his defeat he was recalled by the Convention and threatened with a charge of treason, he sought refuge in the camp of the Austrians, accompanied by the Duc de Chartres (afterwards Louis Philippe) and his brother.

Lost without hope of return to his native country, Dumouriez wandered a long time an exile in Brussel, England, Switzerland, Germany, Denmark, and St Petersburg. At last in 1804 he took up his permanent residence in England, where the Government conferred on him a pension of £1200 a year. In 1814 and 1815 he endeavoured to procure from Louis XVIII the baton of a maréchal of France, but was refused. He died at Torrville Park, near Henley-on-Thames, on the 14th March 1823. His memoirs, written by himself, were published at Hamburg in 1794. An enlarged edition, under the title La Vie et les Mémoires du General Dumouriez, appeared at Paris in 1822. Dumouriez was also the author of a large number of political pamphlets.

DUNAUBURG, a town of European Russia, at the head of a district in the government of Vitebsk, for the most part on the right bank of the Dvina, 12 miles south-east of Riga, in 55° 55' N lat. and 21° 29' E long., and consists of four portions—the main-town of fortress, the old suburb, the new suburb, and on the left bank of the river the village of Grove. The fortress is of the first class, and forms the most important point in the line of defences of the Dvina, the floating harbour across the river is protected by a splendid tête-de-pont. Among the public buildings are five churches, a Roman Catholic chapel, a Jewish synagogue, a gymnasion, and a theatre, and among the industrial establishments several tanneries and breweries, a saw-mill, a flour-mill, brick and tile works, and foundries. Its position on the railway between Warsaw and St. Petersburg, and its double means of communication with Riga, render the town an important commercial centre, especially for the trade in hemp, tallow, and red timber. There are weekly markets and two large annual fairs. The 23,674 inhabitants registered in 1801, 7501 were Jews, 3994 Roman Catholics, and 690 Protestants. In 1873 the total population was 29,613.

Dunbar, or Dunbar and corporate burgh and seaport of Scotland, is the county town of Haddingtonshire, situated on an eminence near the mouth of the Firth of Forth, 29 miles ENE. of Edinburgh by the North British Railway. The ruins of the castle, the remains of the Grey Friars' monastery founded in 1218, and a mansion house of the Lauderslie family, are the principal objects of historical interest. The parish church is a fine building of red sandstone, with a tower about 107 feet in height, which forms a well-known landmark to seamen, it dates only from 1819, but occupies the site of what was probably the first collegiate church established in Scotland, and stands on the site of the large marble monument of Sir George Home, created by the 3rd and 4th earls of Dunbar and March by James VI. in 1605. The town-hall, the assembly rooms, the public schools, the
mechanic's institute and subscription library, and the benevolent institutions require no special notice. The principal source of wealth is the herring fishing, which forms an extensive curving trade; but ship-building is also carried on, and there are several iron foundries, breweries, and distilleries, as well as a large paper-mill in the vicinity. The harbour, formerly small and shallow, has been greatly enlarged and improved in the course of the present century, at the joint expense of the town and the Fishery Board; but the entrance is rendered somewhat dangerous by the number of craggy islets and sunken rocks. Dunbar unites with Haddington, Jedburgh, Lauder, and North Berwick in returning a member to Parliament. In 1875–6 the value of real property was £11,593. Population in 1871, 3,520.

The castle of Dunbar, mentioned as early as 856, from the strength of its position became of great importance as a bulwark against English invasion, and a town grew up under its protection, which was created a royal burgh by David II. It was captured by Edward I, who defeated the forces of Balliol in the neighbourhood of the town in 1296, it afforded shelter to Edward II. en route from Bannockburn, and it was besieged in 1357 by the English under Montague earl of Salisbury, but was successfully defended by Black Agnes of Dunbar, countess of March and a member of the Douglas family. In the 15th century it was used as her usual residence by Joanna Beaufort, the widow of James I. of Scotland; and in the 16th it served on several occasions as a retreat for the unfortunate Queen Mary. An Act of Parliament had been passed in 1488 ordering the demolition of the castle, but it was reserved for the Regent Murray to effect its destruction in 1547. A battle popularly known as the “race of Dunbar” was fought in 1550 between Cromwell and Leslie, and resulted in the total rout of the Scotch.

DUNBAR, WILLIAM, one of the most distinguished of the early poets of Scotland, is supposed to have been born about 1460. Comparatively little is known about his personal history, but, from an allusion in one of his poems, he seems to have been a native of Lothian.1 In his fifteenth or sixteenth year he was sent to the university of St Andrews, where he received the degree of B.A. in 1477, and that of M.A. in 1479.

Of the events of his life for nearly twenty years after this we possess little information. He mentions, however, in his poems that he had been employed as a preaching friar of the order of St Francis, and as much had made good cheer in every flourishing town in England had ascended the pestilence at Dartmouth and Canterbury, and had crossed the sea at Dover, and instructed the inhabitants of Picardy. He also mentions that this mode of life compelled him to have recourse to many a pious fraud, from whose guilt no holy water could clear him. After this he appears to have entered the service of James IV, by whom he was sent on numerous embassies to foreign princes.2 In 1481 he was residing at Paris, most likely in connection with the Scottish embassy there. The knowledge of the Continent he thus obtained must have had considerable influence in imparting greater strength and energy to his poetical conceptions.

In the year 1500 Dunbar obtained from the king a yearly pension of £10, until he should be promoted to one of greater value. In 1501 he went to England with the ambassadors sent to conclude the negotiations for the marriage of the young King James with the Princess Margaret, daughter of Henry VII. During the festivities on this occasion Dunbar was styled “the Rhymer of Scotland,” and received from Henry a present of £6, 13s. 4d. in December, and a similar sum in January of the subsequent year. On his return to Edinburgh a sum of £2 was paid to him in addition to his salary. In honour of this marriage Dunbar composed his well known poem, The Tristram and the Rose, another in honour of the city of London, and several others in which he described the personal attractions of the young queen. After this he lived much at court writing poems, although at the same time he hoped to obtain preferment in the church.

In 1504 he first performed mass before the king, whose offering on that occasion was £4, 18s., a larger sum than that usually paid for the performance of a priest’s first mass. In 1507 his pension was augmented to £20, and three years afterwards it was raised to £80, to be paid during his life, or until he should be promoted to a benefice of £100 or more. In 1511 he seems to have been in the train of Queen Margaret when she visited the northern part of Scotland, as one of his poems, descriptive of her reception at Aberdeen, is evidently written by an eye-witness.

After the disaster of Flodden, in 1513, Dunbar’s fortunes seem to have changed, and no further mention of him occurs as receiving pension. That he may have obtained church preferment is quite possible, but the probability is that the early death of the king, and the unfortunate queen and the little influence she had after her marriage with the earl of Angus, may have led to neglect of Dunbar in his old age. His poems contain many allusions to the unequal division of the world’s goods. He was alive in 1517, as in that year he wrote a poem on the occasion of the Regent Albany passing into France, in which he laments the distracted state of public affairs in Scotland.3 He is supposed to have died about the year 1520, when he had attained his sixtieth year.

The poems of Dunbar, “the dairling of the Scottish muse,” are about a hundred in number, for the most part of no great length. The Tristram and the Rose, written, as before remarked, on the occasion of the marriage of James IV, is an allegory in which he describes the amity between England and Scotland in consequence of that event. The Golden Targe is a moral poem of great power of imagery, in which the ascendancy of love over reason is shown to be general—the golden shield of reason being insufficient to ward off the shafts of Cupid. The Two Mariy Wemen and the Wedo, a tale in which the poet overthrows three females relating their experiences of married life, is an imitation of Chaucer’s Wife of Bath. The Fresta of Berowe, a tale, is in the Chaucerian style. The Flying of Dunbar and Kennedy is perhaps the most obscure of his poems, though it seems to have been very popular, and frequently imitated in the 16th century. Several of his smaller poems show a quick appreciation of peculiarities of character, but some of them—such as the tournament, or Justis betwixt the Taulejour and Sowter—though ludicrous, are very coarse.

In one called Of a Dance in the Queenes Chamer, he describes himself as one of the performers:

Thain cam in Dunbar the makkur, On all the furth thair was none frakkar, And thair he dastit the dyrre dancun, He heppet lyk a pille wantoun For laff of Mungraife, men tellis me, He truppet quhilke blythe ; A munter dance myght na man see.

Another Dance, that of the Sever Dedicie Syna—In which Mahoun, prince of devils, is described as holding a carnival with Pride, Ira, Envy, Covetousness, Idleness, Treachery, Gluttony, each with a train of followers, while a company of fiends stand by enjoying the sport, encouraging...
the performers with various hot applications—is an extravagant a piece as can well be conceived. In contrast, however, he wrote several poems of a religious character, e.g., Off the Nativity of Christ; Off the Passion of Christ, Off the Resurrection of Christ; and The Maner of Pasying to Confessions, &c.

More fortunate than Douglas and some of the earlier Scottish poets, Dunbar had the satisfaction of seeing his principal work in print The Tractat and the Boe, The Golden Trump, The Flying with Kennedy, and the ballad of Lord Bernard Stewart were printed by Chepman and Myllar in 1568, and are the finest collections of stygic verse extant from the Scottish press.

Several of his poems were preserved in the Alonzo MS. written in 1575, the Ramayntye MS. 1568 preserved in the Advocates' library, the Mruttland MS on the Papyrus Library, and the Rossepath MS. in the University Library, Cambridge. Of these detached poems some appeared in collections edited by Allan Ramsay, John Pentland, and Lord Hailes, in the course of the century. Such isolated works as A Lament for the Destruction of Allan, its People and the R'8 were preserved at the Advocates' library, the Mruttland MS. in the Papyrus Library, and the Rossepath MS. in the University Library, Cambridge. Of these detached poems some appeared in collections edited by Allan Ramsay, John Pentland, and Lord Hailes, in the course of the century.

In consequence of the wide-spread mutiny in the British fleet, he had been left with only the "Adaman," 50, besides his own ship the "Venerable," 74, Admiral Duncan proceeded to his usual station off the Texel, where lay at anchor the Dutch squadron of fifteen sail of the line under the command of Vice-Admiral De Winter. From time to time he caused signals to be made, as if to the main body of a fleet in the offing, a stratagem which probably was the cause of his freedom from molestation until, in the middle of June, reinforcements arrived from England. On October 3 the admiral put into Yarmouth Roads to refit and victual his ships, but, receiving information early on the 9th that the enemy was at sea, he immediately hoisted the signal for giving him chase. On the morning of the 11th De Winter's fleet, consisting of four seventy-fours, seven sixty-fours, four fifty-gun ships, two forty-four-gun frigates and two of thirty-two guns, besides smaller vessels, was sighted lying about nine miles from shore, between the villages of Egmont and Camperdown. The British fleet numbered seven seventy-fours, seven sixty-fours, two fifties, two frigates, with a schoon and several cutters, and was slightly superior in force to that of the Dutch. Shortly after mid-day the British ships, without waiting to form in order, broke through the Dutch line, and an engagement commenced which, after heavy loss on both sides, resulted in the taking by the British of eleven of the enemy's vessels. When the action ceased the ships were in nine fathoms water, within five miles of a lee shore, and there was every sign of an approaching gale. So battered were the prizes that it was found impossible to fit them for future service, and one of them, the "Delt," sank on her lane. In recognition of this victory, Admiral Duncan was, on October 21, created Lord Viscout Duncan of Camperdown, and baron of Dunbar, with an annual pension of £2000 to himself and the two next heirs to his title. In 1600 Lord Duncan withdrew from naval service. He died August 4, 1601.

DUNBAR, THOMAS (1807-1845), a distinguished Scottish portrait and historical painter, was born at Kinclaven, in Perthshire, May 24, 1807. He was educated at the Perth Academy, and afterwards began the study of art, which, however, he speedily abandoned for the more congenial pursuit of art. Commencing his new career under the instruction of Sir William Allan, he early attained distinction as a delineator of the human figure, and his first pictures established his fame so completely, that at a very early age he was appointed professor of oil painting, and afterwards of drawing, in the Trustees' Academy of Edinburgh. In 1840 he produced one of his finest pieces, Prince Charles Edward and the Highlanders entering Edin-

"Valiant," was Commodore Keppel's flagship in the expedition against Belissane in that year, and also in 1762, when it took an important part in the capture of Havana. In 1778, on the recommencement of war with France, Captain Duncan was appointed to the "Suffolk," whence before the close of the year he removed to the "Monarch," one of the Channel Fleet. On January 16, 1780, in an action off Cape St Vincent, between a Spanish squadron under Don Juan de Langara and the British fleet under Sir George Rodney, Captain Duncan in the "Monarch" was the first to engage the enemy, and in 1782, as captain of the "Blenheim," he took part in Lord Howe's relief of Gibraltar. From the rank of rear-admiral of the blue, received in 1789, he was gradually promoted until, in 1799, he became admiral of the white. In February 1795 he hoisted his flag as commander-in-chief of the North-Sea fleet, appointed to harass the Batavian navy. Towards the end of May 1797, though, in consequence of the wide-spread mutiny in the British fleet, he had been left with only the "Adaman," 50, besides his own ship the "Venerable," 74, Admiral Duncan proceeded to his usual station off the Texel, where lay at anchor the Dutch squadron of fifteen sail of the line under the command of Vice-Admiral De Winter. From time to time he caused signals to be made, as if to the main body of a fleet in the offing, a stratagem which probably was the cause of his freedom from molestation until, in the middle of June, reinforcements arrived from England. On October 3 the admiral put into Yarmouth Roads to refit and victual his ships, but, receiving information early on the 9th that the enemy was at sea, he immediately hoisted the signal for giving him chase. On the morning of the 11th De Winter's fleet, consisting of four seventy-fours, seven sixty-fours, two fifties, two frigates, with a schoon and several cutters, and was slightly superior in force to that of the Dutch. Shortly after mid-day the British ships, without waiting to form in order, broke through the Dutch line, and an engagement commenced which, after heavy loss on both sides, resulted in the taking by the British of eleven of the enemy's vessels. When the action ceased the ships were in nine fathoms water, within five miles of a lee shore, and there was every sign of an approaching gale. So battered were the prizes that it was found impossible to fit them for future service, and one of them, the "Delt," sank on her lane. In recognition of this victory, Admiral Duncan was, on October 21, created Lord Viscout Duncan of Camperdown, and baron of Dunbar, with an annual pension of £2000 to himself and the two next heirs to his title. In 1600 Lord Duncan withdrew from naval service. He died August 4, 1601.

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burgh after the Battle of Prestonpans. This painting secured his election as an associate of the Royal Academy in 1843. It was, however, his less famous picture of Charles Edward asleep after Culloden, protected by Flora Macdonald, which, like many other of his pieces, has been often engraved. In 1844 appeared his Cupid and his Martyrdom of John Brown of Priesthill, the last effort of his pen with the exception of a portrait of himself, now in the National Gallery in Edinburgh. He particularly excelled in his portraits of ladies and children. He died at Edinburgh, May 25, 1845.

DUNDALE, a parliamentary borough, seaport, and market-town of Ireland, county Louth, on the south bank of the Castledown river, now its mouth in Dundalk Bay, 50 miles north of Dublin. It consists of one long street intersected by several shorter ones. The parish church is an old and spacious edifice with a curious wooden steeple covered with copper, and the Roman Catholic chapel is a handsome building in the style of King's College Chapel, Cambridge. The other public buildings that may be noted are the Exchange Buildings (containing the town hall and a free library), the county court house and prison, the union workhouse and infirmary, and the cavalry barracks. There are several educational establishments in the town. The municipal government is in the hands of town commissioners, and the port is under the control of harbour commissioners. The county assizes are held in the town, as well as quarter and petty sessions; and it returns one member to Parliament. A brisk trade, chiefly in agricultural and dairy produce, is carried on, and the town contains some manufactories. Distilling and brewing are the principal industrial works, and there are besides a flax and jute spinning mill, salt works, &c. The port and harbour of Dundalk have recently been undergoing extensive improvements. The course of the river has been straightened, and the bar and harbour deepened, so that vessels of considerable draught can come up to the town. In the reign of Edward II. Dundalk was a royal city, and Edward Bruce proclaimed himself king there in 1315. Population in 1851, 9995; and in 1871, 11,377. Area, 1386 acres.

DUNDAS, Henry. See MELVILLE, VISOUNT.

DUNDEE, a royal and parliamentary burgh and seaport, is situated on the east coast of Scotland, in the county of Forfar, on the north bank of the Firth of Tay, twelve miles from the confines of that estuary with the German Ocean. It is the third town in Scotland as regards population, and the second in commercial importance. Its latitude is 56° 27' N., its longitude 2° 58' W.; it is distant from Edinburgh 42 miles N.N.E., from Perth 22 miles E., and from Forfar, the county-town, 14 miles S. It extends nearly three miles along the shores of the Tay, and varies in breadth from half a mile to a mile, and the ground gradually rises towards the hill of Balmag and Dundee Law, the summit of the latter being 533 feet above the sea-level. Its general appearance is pleasing and picturesque, and the surrounding scenery very beautiful.

Dundee is the chief seat of the linen manufacture in Scotland, and from a very early time appears to have had a special reputation in this branch of industry. Hector Boece, a native of the town, in his History and Chronicles of Scotland, thus quaintly refers to it: "Dunde, the town quhair we wer born; quhair mony virtuus and laubourous peppt ar in, making of clath." It was not, however, till the introduction of steam power, in the beginning of the present century, that there was any remarkable development in the flax-spinning in Dundee. The first woollen mill importance was the Bell Mill (which is still extant), built in 1806; and the first power-loom factory was erected in 1836. Side by side with the extension of the linen trade has been that of jute spinning and weaving. Large surges of this material are imported into Dundee direct from India, and it is manipulated on an enormous scale. In fact, the manufacture of flax, hemp, and jute fabrics constitutes the staple trade of the town, and supports, directly or indirectly, the great bulk of the inhabitants. There are upwards of seventy steam spinning-mills and power-loom factories, employing above 50,000 persons.

Some of these buildings are of great size and considerable architectural elegance, those of Messrs Baxter, Messrs Cox, and Messrs Gilroy being especially conspicuous. These three afford employment to above 12,000 hands. The principal textile productions are calabogs, doyles, canvas, sheetings, bagging, jute carpeting, &c.; and the total value of these fabrics annually produced has been estimated at upwards of £7,000,000. Among the other industries of Dundee may be mentioned ship-building, engineering, tanning, and leather manufactures (including shoemaking by machinery); all of which are conducted on a large scale. There are also considerable foundries, breweries, corn and flour mills, and confectionery and fruit-preserving works—Messrs Keiller & Son's "Dundee marmalade" having a most extensive reputation. The prosperity of Dundee is in a large measure due to its commodious harbour and its magnificent docks. The harbour works extend about two miles along the river side, and the docks, five in number, cover an area of 33 acres. Although they cannot compare in extent with those of London or Liverpool, they are probably unsurpassed in the kingdom for stability and convenience. They have cost, from 1813, when the works were begun, to May 1877, £480,000; and the harbour revenue amounted in 1876 to £50,751. The principal imports for year ending May 1876 were

Plan of Dundee.
and Godwill, magnificent structure to Schools, the Convalescent Hospital and hall, Asylum building by beque'lt and Town·House, Tile designed there were built at Dundee, the .. Young Men's Association buildings; of 8 H'g'l believed, in 1864, has appeared, the plague to the last 1,186, has been elected, at the ... the site of the last century, or even later, many of the streets were narrow and irregular, and many of the buildings unhealthy and unlighty, but of late a great change for the better has taken place. Under the Improvement Act of 1871, the narrow gorge of the Murraygate has been swept away, the ugly and continual Bucklemaner Wynd has been transformed into the spacious Victoria Road, with the Victoria Bridge at its upper end, and a dense and dingy mass of buildings between Meadowside and Seagate has been replaced by Commercial Street, which, when completed, will be one of the finest wide thoroughfares in Britain. Many improvements still remain to be accomplished, and although the total cost will probably amount to £1,000,000, it is expected that there will be ultimately a profit on the street improvements. By the aid of local building societies a large number of working men's houses have recently been erected, and a double line of tramways has been laid from the post-office to the west end of the town.

Dundee is well supplied with recreation grounds. The Baxter Park, 55 acres in extent, designed by Sir Joseph Paxton, was presented by Sir David Baxter to the community in 1853, the pavilion contains a marble statue of the donor by Sir John Steell, erected by public subscription. The Baldy Park, a picturesque wooded hill commanding fine prospects on every side, was secured by the police commissioners and opened to the public in 1871. Besides these there are the Magdalen Green, the Barrack Park, the Bleaching Green, and Dundee Law. A magnificent promenade along the river side between Magdalen Point and the Craig Pier has lately been opened. It is called the Esplanade, and includes a space of 84 acres, which when filled up will give ample station and traffic accommodation for the Caledonian and North British railways, and leave the public a clear carriage-way and foot-path by the river side. The expense of the undertaking (about £40,000) is borne in nearly equal proportions by the two railway companies and the Harbour Trust, but although the market have recently been constructed by the police commissioners at the east end of the town Dundee has regular and frequent steam-boat traffic with London, Hull, Newcastle, Liverpool, Leith, and Rotterdam. To render communications with the south more direct, the North British Railway Company designed the Tay Bridge, a colossal work, completed in 1877 (see Bridges, vol. iv p. 340).

The water supply of Dundee is copious and excellent. Thirty years ago works were established at Monekie, but in 1876 the quantity (about 21 million gallons per day) proved insufficient, while the quality deteriorated. The loch of Lutranthal, 20 miles distant, with necessary grounds, was accordingly purchased for £53,310. The surface of the loch, originally 180 acres, has been raised 20 feet, and is now 405 acres in extent, the storage capacity is 257,000,000 cubic feet, the drainage area, 19,000 acres. The main pipe from Lutranthal, 27 inches in diameter, transmitting 8 million gallons per day, conveys the water to Clatto reservoir, four miles from the town, which has an area of 21 acres, and holds 80 million gallons; two pipes from Clatto lead to the service reservoirs. The total cost of the works exceeded £300,000.
Dundee possesses a large number of benevolent institutions, as well as "mortifications" (dating from 1656 downwards) for educational purposes. Among eminent men who were natives of Dundee may be named Hector Boscawen or Bostunus, historian, born about 1645; John and Robert Wedderburn, authors or collectors of the book of Gude and Godlie Ballate published 1578; Sir George MacKenzie, the celebrated lawyer, born in 1636; Bearse, a Relation, author of The Afflicted Man's Companion, born 1680; Viscount Duncan of Camperdown, born 1731; James Ivory, an eminent mathematician, born 1674; and Dr Dick, author of The Christian Philosopher, born 1774. The father of Thomas Hood, author of The Song of the Shirt, was a native of the town, and Hood's first literary production appeared in the Dundee Advertiser, about 1816. Robert Nicoll, "Scotland's second Burns," at one time kept a circulating library in Castle Street, and William Thom, the Inverary poet, rests in the Western Cemetery, where a monument was erected by public subscription over his grave.

**Statutes**—The terrible havoc resulting from the siege of 1651 greatly checked the progress of Dundee, but the following century witnessed the beginning of that rapid and healthy growth which of late has so much attracted attention. The following figures show how the population at successive periods of 30 years since 1655.

<table>
<thead>
<tr>
<th>Year</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1750</td>
<td>4,680</td>
</tr>
<tr>
<td>1781</td>
<td>7,574</td>
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<tr>
<td>1811</td>
<td>14,612</td>
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<tr>
<td>1841</td>
<td>27,766</td>
</tr>
<tr>
<td>1871</td>
<td>50,000</td>
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</tbody>
</table>

In 1875 the burgh numbered 55,971, deaths 3976, marriages 2222. The birth-rate was 37 and the death-rate 22 per 1000. The rainfall in Dundee for 1876 was 45 inches, which is considerably above the average, in fact, the highest of any recorded except 1872, when it was 43 70. The number of "wet days" in 1876 was 230, being 90 above the average. The prevailing winds are westerly.

Preceding 1833, Dundee was grouped with Forfar, Perth, Cupar, and St Andrews in returning a member to Parliament; the Reform Act gave it the privilege of a member for itself, and the Act of 1868 added another. Ffor purely municipal purposes the town is divided into nine wards, the third of which includes the populous and thriving suburb of Lochee. The town council is composed of the provost, dean of guild, 6 bailies, and 30 councillors. It also possesses a corporation capable of carrying on all the public business of the town.

In 1855 the ratespayets orally adopted the Free Libraries Act, and advantage has been largely taken of the privileges thus afforded. The library premises are centrally situated in Albert Square, and include a lending library, reference library, museum, and picture gallery, admission being free. In the lending library there are 25,000 volumes, in the reference library 4500. A fine arts exhibition is occasionally held within the free library buildings, and an Art Union for Dundee has just been sanctioned by the Board of Trade.

There are 78 places of worship in the town, which may be classified as follows:—In connection with the Established Church, 16; Free Church, 50; U.P. Church, 5; Congregationalist, 6; Episcopal, 6, Roman Catholic, 4; Baptist, 8; other denominations, 13.

Lochee, a suburb of Dundee, forming part of the munipality, is situated about two miles to the north by the Comar-Angus roads. Till within recent years only a small country village, it has now a population of 18,000. It contains several flax and jute factories, —of far longer and most comprehensive in the whole district, being the Camperdown Linen Works, belonging to Messrs Cox Brothers and Co. They cover an area of 25 acres, and employ upwards of 300 persons. The most striking external feature, and one of the prominent landmarks in the district, is the stately chimney-stack (283 feet high) in the style of the Italian campaniles, built of polychromed bricks, with gable ormes. Broughty Ferry, three miles distant, towards the mouth of the Firth of Tay, may also be considered as a suburb of Dundee. The town is entered by the ferry, built in 1804, and refers to the castle or fortress, which is mentioned repeatedly during the

**Dundee, John Graham of Claverhouse, Viscount (1643-1689), born in or about the year 1643, was the eldest son of Sir William Graham and Lady Jean Carnegie. Of his youth little record has been kept, but in the year 1659 he appeared in St Andrews as a student of St Leonard's College. His education was upon the whole good, as appears from the varied and valuable correspondence of his later years. Young Graham was destined for a military career; and, having remained in St Andrews for about four years, he proceeded abroad as a volunteer in the service of France. Thereafter, in 1674, he went to Holland, and obtained the post of cornet in one of the cavalry regiments of William, prince of Orange. In 1674 he was raised to the rank of captain, as a reward for having rescued the prince from a marshall where his horse had foundered during a retreat. Shortly afterwards, William having at his disposal the command of the regular regiments in Holland, Graham made application for the post. He was not appointed, and resigned his commission. In the beginning of 1677 he returned to England, bearing, it is said, letters of strong recommendation from William to Charles II, and the Duke of York. Early in 1678 he accepted a lieutenantcy in a troop of horse under the command of his relative the Marquis of Monrose. Promotion immediately followed. He was ex-
presumably nominated by Charles II to the command of one of the newly raised troops of cavalry. From the time, indeed, of his return to Scotland he assumed an influential position. His prestige as a soldier, his uncompromising disposition, and his unswerving fidelity, at once marked him out as a leader upon whom Government could rely. In the end of the year he was despatched with his troops to Galloway to suppress the disorders which prevailed in the district. He had a difficult and unpopular task,—that of carrying out the policy of Lauderdale in the most disaffected part of Scotland. The Act of 1670, imposing the punishment of death and confiscation of goods, was still in operation, and the Covenanters had for years before Graham's return to Scotland propounded the theory that opposition to the Government and the actual slaughter of the king were not only just, but a religious duty. Opposition to Lauderdale's measures, however, was winked at by the duke of Hamilton, and the recent authorized inroad of the Highlanders had widened the area of dissatisfaction. It is not wonderful that the success of Graham in his mission was small. He entered, however, upon his occupation with zeal, and interpreted consistently the orders he received. There is evidence, also, that his efforts were appreciated at headquarters, in his appointment, jointly with the lord of Earls­hall, to the office of sheriff-depute of Dumfrieshire in March 1679, with powers—specially narrated in his commission—of "separating," conventicles, "disorderly baptisms and marriages," and the like.

For some years thereafter the position of Graham was perhaps as difficult and delicate as one man was ever called upon to occupy. In the midst of enemies, and in virtue of the most erroneous but direct orders of his Government, he combined the functions of soldier, spy, prosecutor, and judge. Shortly after the murder of Archbishop Sharp, on 5th May 1679, he was summoned to increased activity. There were reports of an intended gathering in the neighbourhood of Glasgow, and at the head of his dragoons Graham went in pursuit of the rebels. On Sunday the 1st of June, the Covenanters having removed from Loudon Hill to a well-protected position upon the marshy ground of the farm of Drumcllog, Graham, who had gone in search of them, advanced. Hindered from the attack by the nature of the ground, he had to wait till the impiety of his adversaries, who were under better leadership than they ever afterwards enjoyed, induced them to commence an impetuous attack. Headed by the youthful Clelland, the Covenanters charged the cavalry, who in a little turned and fled. The loss of the victors was but three men, while thirty-six dragoons were killed, Graham himself having a narrow escape. This was the only regular engagement he had with the Covenanters. Small as it was, the result raised an enthusiasm in the bosoms of the victors, and was the beginning of an actual rebellion.

On the 22d June Graham was present at the battle of Bothwell Bridge, at the head of his own troop immediately thereafter he was commanded to search the south-western shires for those who had taken part in the unsuccessful rising. In this duty he seems to have been engaged till the early part of 1680, when he disappears for a time from the record of these stringent measures. His powers during these months were of the most sweeping description, and it appears that his ample commission was most liberally used. The gravest accusations against him in reference to this period is that he was a robber.

Graham had for some time been recognized as an adherent of the party who were adverse to measures of lenency and conciliation. During these months he was accordingly despatched to London, along with Lord Linlithgow to influence the mind of Charles II against the indulgent method adopted by Monmouth with the extreme Covenanting party. It is perhaps not to his credit that he succeeded in the object of his mission. He was then in the prime of life, was commandingly handsome in appearance, a lover of sport, and a devoted royalist. Charles seems to have been fascinated by his loyal supporter, and from that moment Graham was destined to rise in rank and honours. On the 21st of April 1660 he obtained a royal grant of the barony of the outlawed Macdowall of Freugh, and the grant was confirmed by subsequent orders upon the Exchequer in Scotland. In April 1660 it appears that his roving commission had been withdrawn by the Privy Council. He is thus free from all concern with the severe measures which followed the Sanquier Declaration of 22d June 1659.

The turbulence occasioned by the passing of the Test Act of 1661 required to be quelled by a strong hand, and in the beginning of the following year Graham was again commissioned to act in the disaffected districts. In the end of January he was appointed to the sheriffs of Wigtown, Dumfries, Kirkcudbright, and Annandale. He was besides acting captain of a troop of dragoons—the pernicious combination of his offices being thus repeated. He appears further to have had powers of life and death in virtue of a commission of justiciary granted to him about the same time. In his dispatches there are indications that he disapproved of a system of indiscriminate punishment, and desired that severe vengeance should only be executed upon ring-leaders and men of rank. Thus, however, applied solely to the harshest measures then known to the law, those of torture and death. Where these were involved, he preferred, after hunting out and seizing his prisoners, to send them to Edinburgh for trial. But within these limits his methods of procedure in the large districts over which he had control were uncompromising, and, if we suppose him to have had sympathy with his orders, most cruel. He quartered on the rebels, ruled their houses, and, to use his own words, "endeavoured to destroy them by eating up their provisions." The effect of his policy, if we believe his own writ, is not overstated as

"Death, desolation, ruin, and decay."

The result of a bitter quarrel with Sir John Dalrymple confirmed the prestige of Graham, who was not only acquit­ted by the verdict of the Privy Council of the grave charges of exaction and oppression preferred against him, but had the satisfaction of seeing Sir John condemned to fine and imprisonment for interference with his proceedings. On 25th December 1662 he was appointed colonel of a new regiment raised in Scotland, and captain of its leading troop. He had still greater honours in view, and in March 1663 he started for Newmarket to demand an audience of the king. In the preceding January the case of the earl of Lauderdale, late Master of Hatton, which involved the question of his malversations with regard to the Scottish mint, was debated in the House of Lords. Master of Hatton was proprietor of the lands and lordship of Dundee and Duddingston, and the decree of the Lords against him was in March 1663 issued for the sum of £73,000. Graham succeeded in having the property of the defaulter transferred to him by royal grant, and in May the additional honour was conferred upon him of nomination to the Privy Council of Scotland.

Shortly afterwards Claverhouse was appointed to be present at the sittings of the recently instituted Circuit Court of Justiciary in Stirling, Glasgow, Dumfries, and Jedburgh. The notable objects of the court were the impeachment and the punishment of rebels. Several were sentenced to death. During the rest of the year he attended the meetings of council. As a statesman he was
incapable of rising to an independent view of affairs, and was unable to overcome his dutiful obedience to superior orders. Although he had had experience of the most disaffected portions of the country, there is but one record of his having interfered to prevent the accustomed irritating measures. He decided declaratively against the proposal to let loose the Highland murderers upon the south of Scotland.

In June 1684 he was again at his old employment—the inspection of the southern shires; and in August, after the ambuscade of Enterkine-hill, he was commissioned as second in command of the forces in Ayr and Clydesdale to search out the rebels and report to head-quarters. By this time he was in possession of Dundie, having on the 10th of June married Lady Jean, daughter of Lord Cochrane. As constable of Dundee it is recorded to his honour that he recommended to the Privy Council the remission of extreme punishment in the case of many petty offences. He resumed from his retirement to take part in a commission of lieutenancy which perambulated as a criminal court the southern districts, and in the end of the year he was again in the same region on the occasion of the disturbances in the town of Kirkcudbright.

Shortly after the death of Charles II. (6th February 1665), Graham, through the jealous efforts of Queensberry, incurred a temporary disgrace by his deposition from the office of privy councillor; but in May he was reinstated, although it is to be observed that his commission of justiciary which had expired was not renewed.

In May 1685 he was ordered with his cavalry to guard the borders, and to scour the south-west in search of rebels. By Act of Privy Council, a certificate was required by all persons over sixteen years of age to free them from the hazard of attack from Government officers. Without that they were at once liable to be called upon oath to abjure the declaration of Renwick, which was alleged to be treasonable. While on this mission he pursued and overtook two men, John Brown and a nephew whom he called John Brownie. Brown, having refused the abjuration oath, was shot dead. The order was within the authorized power of Graham.

Until 1688 there is little more of note in his career. In 1686 he was promoted to the rank of major-general, and advanced to his position of insuperable dignity of provost of Dundee. He appears, however, in the Privy Council in 1688 opposing the proposal that Lieutenant-General Douglas should have command of the whole army which had been ordered to England to aid the failing dynasty.

A week or two after his departure with the army his fascinating influence made itself felt upon James II., and amid the hurry of events he was created viscount of Dundee on 12th November 1688. From York he went to Salisbury, where he advised James to steer more steady measures than the feeble-hearted monarch had the courage to adopt. Throughout the vexed journeyings of the king, Dundee is found accompanying or following him, endeavouring in vain to prompt him to make his stand in England and fight rather than flee from the invader. At last James announced his resolve, with the promise that he would send from France an appointment in favour of Dundee to command the troops in Scotland, and arrangements were entered into for communication with the voluntary exile.

Dundee returned to Scotland in anticipation of the meeting of the Convention, and at once exerted himself to increase the waning resolution of the duke of Gordon with regard to holding Edinburgh Castle for the exiled king. He had conceived the idea of forming a rival Convention at Stirling to sit in the name of James II., but the hesitancy of his associates rendered the design futile, and it was given up. Dundee, however, boldly appeared at the first meeting of Convention on 16th March 1688, and disclosed a plot which he declared he had discovered against his own life, but the matter after some inquiry was departed from.

On the 18th of March, desiring the fears of his promised allies, he left Edinburgh at the head of a company of fifty dragoons, who were strongly attached to his person. He was not long gone ere the news was brought to the alarmed Convention that he had been seen clambering up the west side of the castle rock and holding conference with the duke of Gordon. In excitement and confusion order after order was dispatched in reference to the fugitive, and the Convention sat with locked doors to prevent communication with traitors without. Dundee retired to Dundie. On the 30th of March he was publicly denounced as a traitor, and in the latter half of April attempts were made to secure him at Dundie, and the residence in Glen Ogilvy to which he had retired. But the secrecy and speed of his movements outwitted his pursuers, and he retreated to the north. His career presents strange peculiarities. It was only in 1675 that he had returned to Scotland from abroad. Yet in the short period of intervening years he had, despite the opposition of his superiors in rank, risen from the post of captain, and the social status of a small Scotch laird, to positions as a soldier and statesman and the favourite of his sovereigns, of the greatest dignity, influence, and wealth. Yet it was in that period that he committed those acts on account of which his memory is loaded with reproach. When the ruling dynasty changed, and he who had so often been commissioned to quell insurrection had himself become an outlaw and a rebel, he supported the cause of his exiled monarch with such skill and valour that his name and death are recorded as heroic.

On his march into the Highlands he commenced among the chieftains the diplomatic policy in which he excelled. General Hugh Mackay was now in the field against him, and what was simply a Highland chase began. Mackay started with a body of cavalry, marched to the north, having refused reinforcements from the untrained peasantry of Aberdeenshire, pushed the pursuit further and further to the west. Elgin, and latterly Inverness, were occupied by the Government troops. Dundee had in the meantime been scouring the country from Perth, which on the 11th of May he had plundered, to the wilds of Lochaber, to which he had latterly retired. The clans were assembled by the 28th of May, and on the 29th the castle of Ruthven, near Kingussie, was seized. The army of Dundee was now much superior in numbers to that of Mackay, and the prudent general beat a hasty retreat. Having received reinforcements, however, he again advanced northward, and in Strathdon, in the early part of June, it seemed likely that the opposing forces would meet. But the Highland warriors, laden with plunder, were returning homewards, and the army of Dundee was melting away. The outlawed leader again retired, and Mackay conceived his mission at an end. He proceeded westward, and, having garrisoned Inverness, marched to the south.

Throughout the whole of the campaign Dundee was indefatigable in his exertions with the Highland chiefs and his communications with his exiled king. To the day of his death he believed that formidable succour for his cause was about to arrive from Ireland and France. He justly considered himself at the head of the Stewart interest in Scotland, and his dispatches form a record of the little incidents of the campaign, strangely combined with a revelation of the designs of the statesman. It mattered little to him that on the 24th of July a prize of £10,000 had been placed upon his head. The clans had begun to reassemble, and he was now in command of a considerable force.

Mackay, who had visited Edinburgh to report events, re-
turned to Perth, whence, with an army now amounting to about 4000 men, he proceeded to Dunkeld on the 26th of July. While in the metropolis he had endeavoured to secure the Athole interest, and that the castle of Blair should be held for King William. But he was as usual outwitted by Dundee, who, after unsuccessful negotiations with Lord Murray, won over the Athole factor by the presentation of a commission prepared for the occasion. The castle was at once occupied, and at Dunkeld Mackay received intelligence that the design of his march was frustrated. By ten a.m. of the 27th of July 1689 he was at the entrance to the pass of Killiecrankie.

Dundee had appointed a gathering of the clans at Blair for the 29th, and on the 27th he was at the head of at least 2000 men, including a contingent from Ireland. The reports of scouts that 400 of the enemy had already threaded the pass raised the impatience of the chiefs. But it was not until he received intelligence that the whole army of Mackay had entered the defile that he gave the order to march. With caution he disposed his troops on the hills to the right of the opposing army, which, making its exit from the gully, was forming on the heights. On Mackay's right and beyond the narrow plain were undulating heights backed by Craig Culluch. On one of these Mackay was astonished to observe the movement of the troops of Dunwall To prevent the enemy from gaining an intervening eminence, he at once ordered a flank movement, and his army marched up the face of the hilllock, leaving the Garry in the rear. For several hours the two armies faced each other, Dunwall restraining the impatience of his troops, but at eight in the evening the order was given to advance. Mackay had formed his line three deep, while his opponent had arranged his men in battalions with intervals wide enough to prevent the outflanking of superior numbers. The Highlanders having discharged their firelocks threw them on the ground, and rushed impetuously on the foe. The result was instantaneous; Mackay's line was broken and driven helplessly into the gorge. Dundee, at the head of his cavalry, charged the enemy, but, confusion having arisen as to the leadership of the troop, he was not at once followed. The gallant soldier, waving on his men, was pierced beneath the breastplate by a bullet of the enemy, and fell dying from his horse. Dundee asked "how the day went," and, hearing the answer and the expression of sympathy, replied that "it was the least matter for him seeing the day went well for his master." He was conveyed to the castle of Blair, where within an hour or two of his death he was able to write a short account of the engagement in King James's own hand, in which he set down his sons as killed in battle, in which the Government forces had lost 2000 men as against 900 of the enemy, was in truth the end of the massacre. The Highland camp was broken by treachery, for the controlling and commanding genius of the rebellion was no more.

See Memorials and Letters of Graham of Cleishouse, by Mark Neyler, 1594–62, where the literature of the subject is referred to. The work itself must be read with caution (T S)

DUNDONALD, THOMAS COCHRANE, TENTH EARL OF (1775–1800), known during his brilliant naval career as Lord Cochrane, was born at Annfield, in Lanarkshire, on 11th December 1772. His father, the ninth earl, had great scientific attainments, especially in chemistry, and possessed a genius for invention which ruined his fortune without much benefiting any one. He was so poor that the education of Thomas, his eldest son and heir, was left very much to such voluntary instructors as the parish minister. At the age of seventeen Lord Cochrane joined the navy on board the "Hind," of which his uncle, afterwards Admiral Sir Alexander Cochrane, was at the time captain. His father had previously procured for him a commission in the 7th regiment, but his own preference for the other branch of the service was so decided that it was found necessary to satisfy it. In 1795 he was transferred with his uncle to the frigate "Thetis," which proceeded to the North American station. Soon afterwards he received his lieutenant's commission, and in 1798 he was sent to the Mediterranean to serve in the fleet under the command of Lord Keith. He had already begun to show that rare combination of daring and prudence which probably no British naval officer, save Nelson, ever possessed to a greater degree. As commander of the ship "Speedy," to which he was appointed in 1800, he performed a series of exploits in capturing vessels of immensely larger size than his own which are almost without parallel in the annals of naval warfare. The little "Speedy," with its miserably weak armament of four-pounders, became the terror of the Spanish coasters, and more than once she was honoured by a flag being especially detached to capture her. One of the attacks she ingeniously evaded; another she boldly met (28th February 1801), and actually succeeded in capturing her opponent, the "El Ganio," a Spanish frigate of 32 guns. Her cruise of thirteen months, during which she took upwards of fifty vessels with 122 guns and 534 prisoners, ended in her own capture by three French line of battle ships, after making so gallant a resistance that the French captain, to whom Cochrane delivered up his sword, at once returned it. After a brief imprisonment, Lord Cochrane was exchanged. The promotion to post-rank, to which he was fully entitled, came somewhat tardily in August 1801, and the persistence with which his claims had to be urged laid the foundation of the bad understanding with the authorities at the Admiralty that caused him to be lost to the British service a few years later, while he was still in his prime. Its immediate result being that he was refused further employment, he spent the period of enforced leisure (1802) at the university of Edinburgh, where he wisely endeavoured to repair the defects of his early education. The renewal of hostilities in 1803 brought him the opportunity of such distinction as was likely to be gained in the command of the "Arab," an utterly unseaworthy old collier purchased into the navy, in which he was sent to take part in the blockade of Boulogne. The annus against him in official circles was clearly shown when, on his complaining that his vessel was too small for service, he was sent to the North Sea to protect non-existent fisheries. In 1804, on the advent of Lord Mivllie to the head of the Admiralty, tardy justice was done by his appointment to the command of the new frigate "Pallas" (32), in which, after malappraisables, with which he was supplied, and ten days, he entered Plymouth harbour in charge of men with three golden candlesticks, each five feet high, at the mastheads as a sample of the spoils. Before the "Pallas" was again sent to sea her fortunate captain was returned to Parliament as member for Hoxton, partly through the influence of his fame, but still more through the influence of his prize-money. In her second cruise the "Pallas," after conveying a merchant fleet to Quebec, returned to the coast of France, where she cut out and captured several of the enemy's corvettes, and destroyed many of the signs when in August 1806 Lord Cochrane was transferred to the command of the "Imperieuse" (44), in which he was engaged in two years he did immense damage to the enemy's fleet in the Bay of Biscay and the Mediterranean. One of his most gallant exploits during this period was his defence of Port Louis, which he held for twelve days (November 1805) against overwhelming odds. When he found further resistance impossible he blew up the magazines and returned to his ship. Meanwhile, though his services were so distinguished, his relations with the Admiralty had not become more friendly. At the general election in May 1807 he had been returned.
Dundonald

triumphantly for Westminster in the Radical interest, along with Sir Francis Burdett; and during a brief interval spent at home, while he was in command of the "Impetuous," he had rendered himself still further odious as a critic in Parliament of naval abuses. In 1809, however, the authorities had occasion for a daring service which he alone was found competent and willing to undertake. It had been suggested to them that the French fleet at Basque Roads might be destroyed by means of fire ships, and the hazardous duty was intrusted to Cochrane. On the night of the 11th April he personally piloted the vessels laden with explosives to the entrance of the harbour, where they spread such terror that seven French frigates shipped their cables and ran on shore, five of them being afterwards destroyed. Unfortunately this first success was not followed up as it ought to have been. Lord Gambier, the commander of the blockading fleet, ignoring the repeated and urgent requests of Cochrane, refused to order a general attack, and thus the opportunity of destroying the whole of the enemy's ships was lost. Lord Cochrane was bitterly disappointed, and made no attempt to conceal his opinion of the incompetence of his superior, who found himself compelled to demand a court martial. The trial was worse than a mockery; the court was packed, witnesses were manipulated, and charts fabricated,—with the result that Gambier and Cochrane, by implication disgraced. There was, of course, no further professional employment for one who had been stigmatized as a false accuser.

For four critical years Lord Cochrane held no command, and his country lost the services of one of the few naval heroes she has had worthy to compare with Nelson. In 1813, however, the flotilla at Basque Roads was destroyed, and Sir Alexander Cochrane, who had sought to vindicate himself by a satisfactory explanation, led, in the estimation of Lord Cochrane, to the court was packed, witnesses that the greater the odds that had been done him, and was therefore, accepted as a welcome delverance. Lord Cochrane entered on his new duties at Rio de Janeiro in March 1822. His services to Brazil were quite important, though scarcely marked by so many brilliant episodes, as those to Chile, and they were in the end equalled by his activities in the Pacific. His daring capture of Maranham with a single frigate, in July 1823, added a province to the newly-formed empire; and the value of the accession was acknowledged by the title of marquis of Maranham being conferred.
upon the captor, along with an estate, of which, however, Lord Cochrane never obtained possession. In fact, both by Chilt and Brazil he was unjustly deprived of all substantial rewards, and his connection with the new empire which he had done so much to aid in establishing was ignominiously terminated by his dismissal from her service in 1835. He had given some provocation to this by his obstinacy in refusing to appear at a court-martial, and account for his conduct in taking the frigate under his command to England without orders. The Brazilian Government itself, however, practically admitted the gross injustice with which it had treated him by awarding him twenty years afterwards the pension that had been agreed upon in the first engagement made with him.

On his return to England Lord Cochrane found himself the object of a popularity that had grown rather than abated during his absence. His great achievements had been spoken of in the warmest terms in the House of Commons by Sir James Mackintosh, who urged the Government to restore to him his place in the service of his native land. But the time for the redress of his wrongs was not yet, and, finding injustice impossible, he gladly gave his services to the cause of Greek independence. Appointed by the National Assembly admiral of the Greek fleet, he found himself for the first and only time in his career in a position where success was impossible even for him. The want of union and discipline among the Greek troops frustrated all his plans, and an attempt to relieve the Acropolis at Athens in 1827 ended from this cause in a disastrous failure, Lord Cochrane only escaping by jumping into the sea. In 1828, after the Great Powers had secured the recognition of the independence of Greece, he returned to England.

With the accession of King William and the formation of a Liberal ministry there came at last a tardy and imperfect reparation to Lord Cochrane for the injustice he had suffered. He was restored to his rank in the navy, but with this he had to remain content. It was with bitter and indignant feelings that he found himself compelled to accept a pension under the Great Seal instead of the new title he had long and vehemently demanded. And the restoration to his rank was robbed of much of its grace by the facts that the honour of the knighthood of the Bath, of which he had also been deprived, was not restored at the same time, and that the arrears of his pay were withheld. In 1831 he succeeded his father in the earldom of Dunonald. On the 23rd November 1841 he became vice-admiral of the blue.

During the Russian war he revived secret plans which he had detailed to the prince regent nearly fifty years before for the total destruction of an enemy's fleet, and he offered to conduct in person an attack upon Sebastopol and to destroy it in a few hours without loss to the attacking force. That his intellect remained clear and vigorous to the close of his life was shown by the publication in his eighty-fourth year of his Narrative of Service to the Liberation of Greece. An autobiography, in two volumes, the second of which appeared just before his death. The literary style of both works is admirably appropriate to the subject, simple, lucid, and dashing, and the story they tell bears the stamp of heroism and adventure that has scarcely its parallel even in romance. The author's burning sense of his wrongs, and his passionate desire for a thorough vindication, reveal themselves at every turn. If he is not unnaturally blind to the fact that his own impudence and want of self-command contributed in some degree to his misfortunes, no one will now deny that this "heroic soul branded with felon's doom" suffered more cruel and undeserved wrongs than ever fell to the lot of any warrior of his genius and achievements.

Lord Dunonald died at Kensington on the 30th October 1850, and was buried in Westminster Abbey (w. n. s).

DUNEDIN, a city in New Zealand, in 43° 52' 12" S lat. and 170° 52' 37" E long., at the head of Otago harbour, an arm of the sea on the east coast of the South Island. It is the capital of the late province and present provincial district of Otago, and was founded as the chief town of the Otago settlement by settlers sent out under the auspices of the Lay Association of the Free Church of Scotland in 1848. The discovery of large quantities of gold in Otago in 1861 and the following years, and the great increase in the production of wool, have made Dunedin a very flourishing place. The city is beautifully situated in an amphitheatre of hills. The streets, nearly all paved and level, have been made at considerable expense and trouble,—some being carried through swamps and others through cuttings and embankments. The cost of permanent improvements during the last fifteen years has been about £200,000. The town is supplied with pure water, and (since 1862) with gas from works belonging to the corporation. Dunedin is the seat of a judge of the supreme court, and of a resident minister, who is a member of the Colonial Executive, and it also has a Waste Lands Board, a body constituted for the purpose of administering the public estate of the provincial district. The city contains some fine buildings, especially two handsome Presbyterian churches, constructed of white stone from Oamaru. The so-called university of Otago, now affiliated with the university of New Zealand, which alone has the power to grant degrees, possesses halls of classes, mathematics, mental and moral philosophy, as well as lectureships on botany, mineralogy, law, and modern languages. A museum (well built of concrete) contains an excellent collection of New Zealand flora and fauna, including some fine skeletons of the Dacomes. There is called the Otago Institute, a body affiliated with the New Zealand Institute. There are three good libraries—one at the supreme court, a second at the university, and a larger one at the Athenaeum—six banks, and several large mercantile houses. The people are mostly of Scotch origin, with a considerable intermixed population of immigrants from England, Ireland, the British colonies, and Germany. All classes are prosperous except among the extremely limited criminal class, poverty rarely occurs, and absolute pauperism is quite unknown.

Otago harbour, by which the city is approached from the sea, is an inlet about 18 miles long. There is about 22 feet of water on the bar at low tide. Half way up to Dunedin is Port Chalmers, a fine anchorage for the largest vessels, where, owing to the presence of precipitous hills, the land was found too limited in area for a large city. From this point the water grows shallower as it approaches Dunedin. Until lately no vessels drawing more than 10 feet could pass up, but by two years dredging the channel has been made available for steamers drawing 13 or 14 feet, and this depth is gradually being increased. The Harbour Board, which has spent about £250,000 by bonds, of which £129,400 has been raised, but £65,000 is still unexpended. The revenue of the
board is £14,500, which is rapidly increasing, as it arises from a manifold landed endowment. A large part of this money is available for works at the terminus of a line of large mail steamers running monthly to San Francisco via Auckland and Honolulu, but it is now found more convenient to use smaller steamers for the coastal section. It is, however, still the terminus of a line of five vessels running at intervals of about ten days to Melbourne, and carrying the monthly mail for Suez and England. There is also direct steam communication with Sydney and Hobart Town, and communication via Auckland with Fiji. All the coasting steamers and many sailing vessels are owned in Dunedin. In 1875, besides the San Francisco boats, 69 vessels, varying from 250 to 1000 tons, entered the port from places beyond the seas other than Australasia. The greater number of these arrive in the early part of the summer, and load with wool for London. The customs revenue collected in 1876 amounted to £92,355. The municipal debt amounts to £292,000, and the revenue (raised by rates, rents, water, and gas works, &c.) to £47,500. The population of the city in the beginning of 1877 was about 22,500, and that of the suburbs about 9000, while other towns within a circuit of a few miles bring it up to 35,000.

DUNFERMLINE, a city and royal burgh of Scotland, situated in the western district of the county of Fife, about three miles from Limekilns, the nearest point on the Firth of Forth. It is connected with Glasgow by railway via Stirling, and with Edinburgh, from which it is distant 16 miles, via Thornton and by a direct line constructed in 1877 to North Queensferry. The town is situated about 300 feet above the sea, on the brow of a slope which ascends from the Forth, and it accordingly commands a very extensive view of the country towards the south. It is intersected from north to south by a deep ravine, at the bottom of which a small stream pours its tortuous course; and this ravine is crossed by an earthen mound, on which an excellent street is built. At the east end of the town, on the south side of the turnpike road, is a public road comprising about 36 acres, partly the gift of the late Mr Ker of Middlebank; and to the north of the road, at a little distance, are the jail, the workhouse, a hospital, and a cemetery, all in close proximity to each other. The county burgh, with its tall and graceful spire 132 feet high, is inserted above his resting-place within the abbey. The town is well supplied with means of education in all the ordinary branches, but there is no special provision for the higher departments of learning.

The staple industry of Dunfermline is the manufacture of table-linen, and in this department it has almost no rival. The weaving of damask was introduced into the town in 1718 by a Mr James Blake, who had succeeded in getting possession of the jealously guarded secret in workshops at Drumsheugh, near Edinburgh, to which he obtained access by feigning idiocy. Till about 1845 the bulk of the population were engaged on handlooms, but at present only a comparatively small number earn a scanty and precarious subsistence by the old method. The eleven power-loom factories in the town in 1877 give employment to about 5000 persons, of whom a large proportion are females. The annual value of the goods manufactured is about £500,000. Iron and brass foundries, soapworks, and dyeworks are among the minor industrial establishments, and in the vicinity there are about 22 collieries.

Dunfermline returns a member to Parliament in connexion with Stirling, Inverkeithing, and Culross. The population of the town was 14,963 in 1871, and is now (1877) 15,858, that of the parish, which, besides the strictly rural district around, includes Limekils and Charleston, with several colliery districts, was 23,123 in 1871, and is now 24,329. The town is governed by a council consisting of 22 members, including a provost, four bailies, and other officers. The revenue of the town, derived principally from coal-fields, was £7875 in 1876. The number of inhabited houses is 1638; the annual value of real property, £56,038. There are two newspapers published weekly, and four banks, besides the National Savings Bank.

In spite of the introduction in 1850 of an apparently abundant supply of spring water, a scarcity has since been felt in dry seasons; and accordingly at present (1877) new works are in progress to effect a communication with the River Devon. It is anticipated that the cost of these will be nearly £60,000. Drainage works are also being constructed, at an estimated cost of £5000, to convey the sewage of the city to the sea at Limekils. The situation of Dunfermline is very favorable, the birth rate is 40 per thousand, the rate of mortality 13 4, and the marriage rate 8 7.
DUNFERMLINE, Lord See Abercromby
DUNGANNO, a parliamentary borough and market-town of Ireland, in the county of Tyrone, standing on an activity 8 miles W of the south-western shore of Lough Neagh, and 94 miles N W of Dublin. It consists of a square with diverging streets, and is generally well built. The only public buildings of note are the parish church, with an octagonal spire, a court-house, a market hall, and a college founded by Charles I. Latins are manufactured and coarse earthenware. The town also contains a power-loom weaving factory and flour mills. It returns one member to Parliament. The early history of the place is identified with the once powerful family of the O'Neals, whose chief residence was there. In 1642 the independence of the Irish Parliament was proclaimed in 1782.

The population in 1871 was 3886, of whom 55 per cent were Roman Catholics, and 230 acres.

DUNGANRAN, a parliamentary borough, market-town, and seaport of Ireland, in the county of Westport, 125 miles S W of Dublin. It is situated on the Bay of Dunganran, at the mouth of the Colligan, which divides the town into two parts, connected by a bridge of a single arch. The eastern suburb is called Abbeyville, where the remains of an ancient keep, erected by the O'Gusheen, still exists. The town contains a town hall, a season's house, a union workhouse, a market house, and barracks. The town is carried on to a small extent, and there is a steam mill. The borough returns one member to Parliament (Area of town, 392 acres, of borough, 419 acres, Population of borough, 1745). In 1793, of whom 36 per cent were Roman Catholics.

DUNKELD, a borough of barony and market-town of Perthshire, Scotland, situated on the north bank of the Tay, 15 miles N W of Perth. The river is crossed there by a fine bridge of seven arches, begun in 1605 and completed in 1608, at a cost of £42,000. The town is remarkable for its large and well-preserved Quakers' meeting-house and adjoining buildings, the village consists of narrow and ill-built streets presenting an antiquated aspect. It is burned among the dark shades of luxuriant trees, and stands in the centre of a valley surrounded by mountains of considerable elevation, which are wooded to their summits. The river, the bridge, the surrounding mountains, and the remains of an ancient cathedral combine to give the town a very romantic appearance. As early as 729 the Caledions had a monastery at Dunkeld, which was converted into a cathedral by David I. in 1127. Its architecture is of a composite character, exhibiting features both of the Norman and pointed styles. The centre of the nave is about 120 feet by 60, the walls are 40 feet high, and the aisles 12 feet wide. The choir was founded by Bishop Simler in 1150, and completed by Bishop Farcher in 1,469, and by Bishop Brown in 1,501. It contains four bells. The cathedral was never roofed at the Reformation, but the choir has been rebuilt, and is now used as the parish church. Beneath the choir-house is the sepulchral vault of the Athole family. The porch of the church is the tomb of Alexander Stuart, earl of Buchan, better known as the Wolf of Badenoch, who died in 1394. The most famous of the bishops of Dunkeld was George Douglas, the translator of the _Ecclesiasticum_ immediately behind the cathedral stands Dunkeld House, the mansion of the dukes of Athole. The grounds of the ducal residence (which are extensive and picturesque) contain two of the earliest larch trees introduced into Britain, they were brought from Tyrol in 1728. A mile south of Dunkeld, on the other side of the Tay, is the modern village of Birnam, which has sprung up at the railway station. It lies at the foot of Birnam hill, and derives its name from the famous wood connected with the fate of Macbeth. The population of the burgh in 1871 was 783.

DUNKERS, or Dunkers, a sect of American Baptists originating in Germany. The name, as its second form indicates, is a nickname meaning _dippers_, from the German _tucken_, to dip. From the first the members recognized no other name than "Brethren." The founder of the sect was Alexander Mack of Schwartzeman, who, along with one or two companions, was led to adopt anti-pedobaptist views about the year 1708. It had scarcely assumed organized character in Germany when its members were compelled by persecution to take refuge in Holland, from which they emigrated to Pennsylvania in small companies in the years between 1720 and 1729. Their first community was established at Germantown, not far from Philadelphia, and other settlements were gradually formed in New England, Maryland, Virginia, Ohio, and Indiana. In the early history of the sect the sect dwelt apart, and marriage, while not forbidden, was discouraged. Similarly, while the holding of private property was not absolutely prohibited, a certain community of goods was established and maintained by the voluntary action of the members, and it was considered unlawful to take interest for money. These features have now disappeared, but in other respects the sect retains much of its original character. Every member has the right to exhort and take part in the religious services, and for a considerable period on special provision was made for the conduct of worship there is now, however, a recognized unpaid ministry of bishops and teachers. These are also deacons and deaconesses. In baptism, true immersion is used. The Lord's Supper is observed in the evening only, and connected with it are the _larges_ and other religious feasts, and the apostolic "_fastes_." Putting a literal interpretation on James v. 14, they provide the amounting with oil for the healing of the sick, and many of them will not adopt any other means of recovery. They exhale (except inQ the Quakers') and their refusal to take oaths or to serve in war. Their number, which at one time was estimated at 30,000, has very considerably declined, and the latest account states it at less than 8000. An early offshoot from the general body of Dunkers were the Seventh Day Dunkers, whose distinctive principle, as their name importes, was that the seventh day, and not the first day, of the week was the true Sabbath intended to be perpetually and universally observed. Their founder was Conrad Peyer, one of the first emigrants who established a settlement at Ephrata, about 20 miles from Philadelphia, in 1733. This branch of the sect has almost died out.

DUNKIRK, or Dunkirk, a strongly fortified seaport town of France, and capital of an arrondissement in the department of Nord, is situated on the Straits of Dover, 40 miles N W of Lille, and 194 N from Fins, in 51° 22' N lat. and 2° 22' 32" E. long. It is a well-built town, the streets being large, wide, and regular. It is divided into three parts: (1) the town proper, which is the centre of trade; (2) the low town, containing the principal industries, and (3) the town, including docks and granaries, and containing the houses of labourers and sailors. Dunkirk is both a naval port and...
one of the merchant ports of Paris, and has two harbours, its maritime trade employing about 5000 vessels with a tonnage of 270,000. The docks occupy about 100 acres.

It possesses sugar refineries, starch manufactories, distilleries, foundries, and large ship-building yards. The fisheries of the coast are valuable and extensive. The public buildings most worthy of notice are the church of St. Eleusis, constructed about 1650 in the Gothic style, with a Cornishian pediment. In 1783, the lighthouse, 170 feet high; the Beffroi, 300 feet high, surmounted with signals for vessels in distress, and containing a celebrated peal of bells; the exchange, the second story of which is a gallery for pictures, statuary, medals, and curiosities; and the theatre. The principal square contains the statue of Jean Bart by David of Angers.

Dunkirk is said to have originated in a chapel founded by St. Eleusis in the 7th century, round which a small village slowly sprung up. In the 13th century Baldwin III., count of Flanders, raised it to the rank of a town. In 1388 it was burned by the English, and in the 16th century Charles V. built a tower for its defence, of which no traces now remain. In 1552 the English, who had been in possession of the town, were expelled by the French, who, in the ensuing year surrendered it to the Spaniards. In 1646 it once more passed into the hands of the French, who, after a few years' occupation of it, again restored it to Spain in 1665. It was retaken by the French and made over to the English in 1674, Charles II., being in money difficulties, sold it to the French king Louis XIV., who fortified it. In 1759 it was attacked by the English under the duke of York, who, however, were compelled to retire from its walls with severe losses.

The population in 1872 was 34,342.

DUNKIRK, a lake-port town of the United States, in Chautauqua county, New York, situated on a small bay in Lake Erie, 40 miles south-west of Buffalo. It is an important station on the Lake railroad, and forms the western terminus of the Erie line; and by means of the Carrolton railroad it has connection with the Pennsylvania coal-fields. The town occupies an elevated and agreeable position on the lake, and its harbour is free of ice earlier in the spring than the neighbouring port of Buffalo. The industries of the place comprise oil-refining, and the manufacture of glue, flour, and iron-work. Population (1870), 5531.

DUNMOW, GREAT, a market-town of England, in Essex, situated on a sva militaris, some remains of which it consists. It consists of two good streets, built on an acclivity near the right bank of the Chelmer, 40 miles north-east of London by rail. Its public buildings include a town hall and a literary institute, besides the parish church of St. Mary the Virgin, recently restored. Population in 1871, 2986. Two miles to the east is the village of Little Dunmow (population, 359), formerly the seat of a priory remarkable for the custom of presenting a fish of bacon to any couple who could satisfy a jury of six bachelors and six maidens that they had spent the first year of married life in perfect harmony, and had never at any moment wished they had married. The institution of this strange matrimonial prize—which had its parallel at Whakonour (or Winchour) in Staffordshire, at St. Meleins in Brittany, and apparently also at Vaucouleurs—appears to date from the reign of John; and the only instances recorded of its occurrence are in 1445, 1467, 1701, 1751, and 1763. A revival of the custom was effected in 1655 by Mr. Harrison Ainsworth, but the scene of the ceremony was transferred to the town-hall of Great Dunmow. For details see Chamber's Book of Days, vol. ii. p. 745-751; and W. Andrews, History of the Dunmow Flitch of Bacon Customs, 1877.

DUNNING, JOHN, BARON ASHBURTON (1731-1783), an eminent English lawyer, the second son of John Dunning of Ashburnton, Devonshire, an attorney, was born at Ashburnton, October 18, 1731, and was educated at the free grammar school of his native place, where he distinguished himself in classics and mathematics. On leaving school he was taken into his father's office, where he remained until the age of nineteen, when he was sent to the Temple. Called to the bar in 1756, he came very slowly into practice. He went the Western Circuit for several years without receiving a single brief. In 1762 he was employed to draw up A Defence of the United Company of Merchants of England trading to the East Indies, and their Servants, particularly those at Bengal, against the Complainants of the Dutch East India Company to his Majesty on that subject; and the matter style which characterized the document procured him at once reputation and emolument. In 1763 he distinguished himself as counsel on the side of Wilkes, whose cause he conducted throughout. His powerful argument against the validity of general warrants (18th June, 1763) established his reputation, and his professional business from that period gradually increased to such an extent that in 1776 he is said to have been in the receipt of nearly £10,000 per annum. In 1766 he was chosen recorder of Bristol, and in December 1767 he was appointed solicitor-general. The latter year witnessed his marriage; and in 1770, when he retired, along with his friend Lord Shelburne, in 1771 he was presented with the freedom of the city of London. From this period he was considered as a regular member of the Opposition, and distinguished himself by many able speeches in Parliament. He was first chosen member for Calne in 1768, and continued to represent that borough until he was promoted to the peerage. In 1780 he brought forward a motion that the "influence of the crown had increased, was increasing, and ought to be diminished," which he carried by a majority of eighteen. He strongly opposed the system of sincere offices and pensions; but his probity was not strong enough to prevent his taking advantage of it for himself. In 1783, when the marquis of Rockingham became prime minister, Dunning was appointed chancellor of the duchy of Lancaster, a rich sinecure; and about the same time he was advanced to the peerage, by the title of Lord Ashburnton. Under Lord Shelburne's administration he accepted a pension of £4000 a year. He died while on a visit to Exmouth, August 18, 1783. Though possessed of an insignificant person, a awkward manner, and a provincial accent, Lord Ashburnton was one of the most fluent and persuasive orators of his time. Sir William Jones speaks in the highest terms of his eloquence and wit, and Bentham commended the closeness of his reasoning.

Besides the answer to the Dutch memorial, Lord Ashburnton is supposed to have satirized in writing a pamphlet on the law of libel, and to have been the author of A Letter to the Proprietors of John Stock, on the Subject of Lord Shelburne's Letter on that Subject, 1764, 8vo. He was at one time suspected of being the author of the celebrated Letters of Junius.

DUNOIS, JEAN (1402-1468), Count of Orleans and Longueville, commonly called the "Bastard of Orleans," a celebrated French warrior and grand-chamberlain of France, was the natural son of the duke of Orleans (brother of Charles VI.) and Mariette d' Enghein, Madame de Cergy, and was born at Paris the 23d November 1402. He was brought up in the house of the duke, and in the company of his legitimate sons. He was the surprise and rout in 1427 of the English, who were besieging Montargis,—the first successful blow against the English power in France following a long series of French defeats. In 1428 he threw himself into Orleans, and was the principal means of enabling the garrison to hold out until the arrival of Joan of Arc, with whom he shared with her the honour of defeating the enemy there in 1429. He then accompanied Joan to Rheims, and shared in the victory of Patay. After her death he raised the siege of Chartres and of Lagny, and drove the English from Paris, which he entered in triumph on the 13th April 1436. The English retreated gradually out of the limits of France, and thence into Normandy; and Dunois, having in 1449 been raised to the rank of lieutenant-general, soon conquered from them the whole
of that province. In 1451 he attacked them in Guinée, taking among other towns Bordeaux, which the English had held for 300 years. At the conclusion of those conquests Charles VII. legitimated him, and gave him the title of defender of his country, and there was a grand chamberlain, but on the death of Charles, Louis XI. deprived him of his titles and dignities. He then joined the league of revolted princes, but, assuming the function of negotiator, and thus securing the favour of the king, he was reinstated in his offices, and named president of the council for the reform of the state. He died 28th November 1465.

DUNNOON, a town in Argyllshire, Scotland, situated on the Firth of Clyde, about nine miles west from Greenock, and on the opposite shore. Of recent growth (having been about the beginning of this century a mere fishing hamlet), it is now one of the most extensive and populous watering-places on the shores of the Clyde, a condition for which it is much indebted to the late James Ewing of Strathearn, who first drew attention to its capabilities as an agreeable summer residence. On account of the mildness of the climate that prevails, and the amelity of the situation, it was selected as the site of a convalescent home, which has proved a boon to many of the hard-wrought in all brances of learning, but, as is usually given, the arguments of Duns Scotus. In 1387 it formally condemned the Thomist doctrine, and a century afterwards it required all who received the doctor's degree to bind themselves by an oath to defend the doctrine of the Immaculate Conception. In 1388 Duns Scotus was sent by the general of his order to Cologne with the twofold object of engaging in a controversy with the Reghards and of assisting in the foundation of a university. He was received with great ceremony by the magistrates and nobles of the city. After a very short residence, however, he died of apoplexy on the 8th November 1308. The story told by Paulus Jovius, that on his grave being opened some time after his death his body was found to have turned in the coffin, from which it was inferred that he had been burned alive, is generally regarded as fabulous.

Duns Scotus was one of the great leaders of scholastic thought, and, as a full account of his philosophical system must therefore necessarily be given in the general article on SCHOLASTICISM, a brief indication of its leading points will suffice here. It may be noted at the outset that the philosophical position of Duns Scotus was determined, or at least very greatly influenced, by the antagonism that existed between the Dominican and the Franciscan Thomas Aquinas was a Dominican, Duns Scotus was a Franciscan, and hence arose the schism between the Thomists and the Scotists. Aquinas ranks in philosophy with the realists as well as Duns Scotus, but his view in regard to the great philosophical controversy of the Middle Ages was a modified or eclectic one in comparison with that of Duns Scotus, who as the true representative and apostle of scholastic realism. Theologically, the doctrine of the Immaculate Conception was the great subject in dispute between the two parties. There were, however, differences of a wider and deeper kind. In opposition to Aquinas, who maintained that reason and revelation were two independent sources of knowledge, Duns Scotus held that there was no true knowledge of anything knowable apart from theology as based upon revelation. In conformity with this principle he denied that the existence of God was capable of being proved, or that the nature of God was capable of being comprehended. He therefore rejected as worthless the ontological proof offered by Aquinas. Another chief point of difference with Aquinas, which in regard to the freedom of the will, which Duns Scotus maintained absolutely. He held also in an unqualified form the doctrine of predestination, and he reconciled free-will and necessity by representing the divine decree as a temporally antecedent, but as immediately related to the action of the created will. He maintained, in opposition to Aquinas, that the will was independent of the understanding, and that only will could affect will. From this difference as to the nature of free-will followed by necessary consequence a difference with the Thomists as to the operation of divine grace. In ethics the distinction he drew between natural and theological virtue is common to him with the rest of the scholastics, among others with his great opponent. (See Aquinas, vol. ii p. 232-3) Duns Scotus strongly upheld the authority of the church, making it the ultimate authority on which that of Scripture depends.

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The works of Duns Scotus were very numerous, though in the collection edited by Luke Wadding, a Franciscan (12 vols., fol., Lyons, 1639), several are ascribed to him without sufficient ground. This edition contains a life full of legends, which was reprinted separately (Mons, 1644).

The most important of the works of Duns Scotus consisted of questions and commentaries on the writings of Aristotle, and on the Sentences of Lombard. For the theology of Etskus see the Summa Theologica en Societate, by Jerome de Fortin, a Franciscan, the Resolution doctrinaria Societatis, by F. E. Allegro, (Lyons, 1643), and the Contrarum theologiarum sermones de S. Thomae de Aquino, De Beato, a Spanish Franciscan (Venice, 1599). Of more recent authorities particular value attaches to Baumgarten-Crusius's De Theologia Scot., Jena, 1826; and an article by Erdmann in the Theologische Studien und Kritiken for 1863. On the philosophy of Duns Scotus see Ritter's Geschichte der Philosophie und Ueberweg's Geschichte der Philosophie.

DUNSTABLE, a market-town and, since 1864, a municipal borough of England, in the county of Bedfordshire, N.W. of London, and 18 miles S.S.W. of Bedford, with communication by both the North-Western and the Great Northern railways. Its parish church, a fine old building, formerly part of the Augustinian priory, was restored about 1865, the principal points of interest are the richly decorated choir, the ancient monuments of the Chichele family, and, among the interior adornments, Sir James Thornhill's painting of the Last Supper. The five dissenting churches, the temperance hall, several almshouses, and the Ashton charity and other schools complete the list of public buildings. Straw-plaiting and the making of straw hats and bonnets are the principal industries; and, as a consequence, the female considerably outnumbers the male population. The census of 1861 gave 2712 females out of a total of 4470 inhabitants; and that of 1871, 2702 out of 4658.

From its situation at the junction of the ancient Watling and Icknield Streets, it seems probable that Dunstable was a Roman station, but its identification, whether with Magnusinum or Durcombruma, is not certainly established. Matthew Paris mentions, in his Lives of the Abbots of St Albans, that about 1110 the play of St Catherine was acted in the town by direction of Geoffrey, afterwards abbott of St Albans, and thus the name of Dunstable is associated with the very earliest authenticated notice of theatrical representation in England. The Augustinian priory, to which it was afterwards indebted for its celebrity, was founded in 1131 by Henry I., and for a long period exercised lordship over the town. From 1247 to 1292 there was a violent dispute between the burgesses and the canons, but the claims of the latter were acknowledged by Henry III., the paterfamilias. It was at Dunstable that in 1244 the discontented barons met and ordered the papal legate, who was with the pope's legates, to leave the kingdom; and in 1258 the commissioners for the divorce of Queen Catherine sat in the town. The exchequer from 1210 to 1242 are due to Richard de Maris, the prior. The original is a parchment folio preserved among the Cotton MSS in the British Museum (Tiberius, A. 10). It was greatly damaged by the fire of 1731, and is consequently slightly imperfect, in spite of the care with which it has been stretched and mended. Hearne published an edition in 1733, from a copy secured temporarily by Humphrey Wanley (Harissian MSS, 4580); another by H. R. Luard, from the original MS., completes 420 pages of vol. ii. of the Antiquae Romanae, published by the Master of the Rolls.

DUNSTAN, Sr (924 or 925–988), was born at Glastonbury in 924 or 925. His father, Herstan, was brother of Elfhest the Bold, bishop of Winchester, and the tradition that he was connected with the royal house seems not improbable. As a child he was placed under the care of certain Irish teachers who had settled at Glastonbury; and he devoted his boyhood to study with a fervour so intense that he at length brought on himself a severe attack of brain fever, after the effects of which he was still apparent in the fantastic visions which troubled his after life. He was still a boy when he entered the house of Athelstan, and he was only fifteen or sixteen at the accession of Edmund; but he had not been long at court before his ambitious and lofty temper had made him the bitter enemies. In all the accomplishments of his time, except those of the warrior, he stood pre-eminent. His memory was stored with the ancient Irish ballads and legends, and he excelled in music, in painting, and even in the mechanical arts. But he soon found that his talents, while making him a favourite with the ladies, had inflamed the jealousy of his rough, ignorant soldier rivals. He was accused of dealing in witchcraft, was driven with rude force from the court, and, perhaps under the pretext of testing whether he was really wizard or no, was flung into a muddy pond, whence he was glad to escape to the protection of his uncle Elfric. The cause of this outrage was a second attack of fever, from which he rose to yield to his uncle's persuasions, and take the vows as a monk. It was with great reluctance that he took this step, for he was deeply in love with a lady at court; but the feeling, natural in that age, that his illness was a direct indication of the will of providence, was likely to impress itself with peculiar force upon an imagination such as his, and he was also, doubtless, conscious that the only protection for his physical weakness lay in the power of the church. After his recovery, he spent some time quietly studying and teaching, and practising the austerity which gained him the reputation of a saint; but it was not long before he returned to court. Again his enemies seemed likely to prove too powerful for him. He, however, gained the favour of King Edmund, who created him abbot of Glastonbury when he was about twenty-two years of age. He became principal treasurer of the kingdom, and we find him a few years later (953), on account of his tenure of that office, refusing an offer of the see of Crediton.

From 946 to 955 the throne was occupied by Edred, whose constant ill health threw the chief power into Dunstan's hands. In 955 Edwy came to the throne; and the party of Edgiva, to which Dunstan belonged, lost its influence. Of the details of the party struggles which ensued we have no trustworthy information; but one incident of the quarrel between the king and the minister has become famous. Edwy, though then probably a mere boy, was deeply in love with his kinswoman Elgiva, whose mother Ethelgiva, a lady of the highest rank, is accused, with what degree of truth cannot now be determined, of having used the most shameless means to gain power over the young king. What relationship really existed between Edwy and Elgiva is unknown, but it was such as to be considered by the churchmen as an insupportable to marriage. Edwy, however, defied their opposition. On the evening of his coronation he withdrew from the banquet to the society of Elgiva. Dunstan was sent by the Witun to recall him, and exhibited a violence which may be excused, when we consider that Edwy had both grievously insulted the Witun and openly sought, upon so solemn an occasion, the dangerous society of a girl whom the church forbade him to marry.

A year or so after Ethelgiva and her party triumphed, and Dunstan being outlawed, was obliged to flee to Ghent. In 957, however, a revolt placed Edwy's brother Edgar on the throne of Mercia and Northumbria, and at his court Dunstan resumed his old position of chief minister. He was created bishop (perhaps at first without a see); and, in defiance of strict ecclesiastical law, he obtained and held at once the sees of Worcester and London. By the death of Edwy in 955, Edgar gained the sovereignty of Wessex, and in the ears of which, a few months after Dunstan was appointed archbishop of Canterbury.1

1 In connection with the coronation of Edgar, Osbern of Canterbury tells a story intended to exalt the archbishop. The king having
Dunstan's influence secured the crown for Edward. But a fierce struggle ensued between Dunstan and his enemies. In 977 the Witan met three times, and the last meeting, that at Canterbury, was signalized by an accident, which inflicted a mortal wound. Dunstan's life was preserved, either by the timely intercession of St. Ethelred the Unready, or by the influence of Dunstan's enemies. The Witan was assembled again, when it was announced that the king had ordered Dunstan to withdraw from the court. Dunstan retired to the monastery of Eynsford, and remained there until the death of Ethelred. During the reign of Edgar, Dunstan was again called to the court, and continued to exercise his influence till his death. His influence was felt in the selection of bishops, and in the establishment of religious houses. He was a great patron of learning, and his influence was felt in the establishment of the first universities. Dunstan was a man of profound learning, and his works are a valuable source of information about the history of the Church in England.

Dunstan's influence is still felt in the Church. His influence was not confined to England, but extended to other countries. He was a great missionary, and his influence was felt in the establishment of new monasteries. Dunstan's influence is still felt in the Church, and his works are a valuable source of information about the history of the Church in England.
his vessel was wrecked at the Malouin Islands. In 1832 he attained the rank of lieutenant, and was entrusted with the command of the "Cochin," which during the next three years was engaged in scientific explorations in the South Pacific and along the coasts of South America. From this voyage he brought back not only great additions to cartography and important data in regard to the currents of the Pacific, but also numerous specimens of rare and interesting shells, so that he became the captain of the magnet's equator, and to prove the equality of the flattening of the two hemispheres. During the rest of his life he devoted himself mainly to the investigation of terrestrial magnetism; and the value of his labours was recognized by his admission into the Académie des Sciences in 1842. He died in August 1865.

The following are his principal works:—Les Voies historiques, the Hydrographie, and the Physique du Voyage autour du Monde sur la Cochinch, Paris 1838-1850, and extensive contributions to Bucquoy's Traité de l'Étoile.

DUPERRON, JACQUES DAVY (1556-1618), a celebrated French cardinal, was born at St Lo, in Normandy, November 15, 1556. His father was educated for a physician, but on embracing the doctrines of the Reformation became a Protestant minister, and to escape persecution settled at Bern, in Switzerland. Here Jacques Davy received his education, being taught Latin and mathematics by his father, and learning without the aid of any one Greek and Hebrew, and the philosophy which was then in vogue. At twenty years of age he came to Paris, and was presented to the king by the count of Matignon; and, after he had abjured Protestantism, being again presented by Philip Desportes, abbot of Tiron, as a young man without equal for knowledge and talent, he was appointed to the king. He was commanded to preach before the king at the convent of Vincennes, when the success of his sermon on the love of God, and of a funeral oration on the poet Ronsard, induced the king to appoint him his assistant in theology, which, though it contained an attack on Elizabeth of England that the king thought it prudent to disavow, tended to advance both the prosperity of God, and of a funeral oration on the poet Ronsard, induced the king to appoint him his assistant in theology, which, though it contained an attack on Elizabeth of England that the king thought it prudent to disavow, tended to advance both the prosperity of God, and the interests of the Church. At the end of 1832 he became president of the chamber, which office he held successively for eight years. On Louis Philippe's abdication in 1848 Dupin introduced the young count of Paris into the chamber, and proposed him as king with the duchess of Orleans as regent. This attempt failed, as Dupin submitted to circumstances, and, retaining the office of procureur-general, his first act was to decide that justice should henceforth be rendered to the "name of the French people." In 1849 he was elected a member of the Assembly, and became president of the principal committee—that on legislation. After the coup d'état of 2d December 1851 he still retained his office of procureur-général, and did not demit it till it was given to the decrees confiscating the property of the house of Orleans. In 1857 he was offered his old office by the emperor, and accepted it, explaining his acceptance in a discourse, a sentence of which may be employed to describe his whole political career. "I have always," he said, "belonged to France and never to parties." He died 8th November 1865. Among Dupin's works, which are numerous, may be mentioned Principes Juris Civilis, 5 vols. (1806); Mémoires et plaidoyers de 1806 au 1er Janvier 1850, in 20 vols.; and Mémoires ou souvenirs du barreau, in 4 vols. 1855-56.

DUPIN, LOUIS ELLIUS (1657-1719), a celebrated French ecclesiastical historian, belonged to a noble family in Normandy, and was born at Paris on the 17th June 1657. He received his early education from his father, and had scarcely reached his tenth year when he entered the college of Harcourt, where he graduated as A.M. in 1672. He was distinguished among the students by his genius for learning. He was passionately fond of the sciences, and was educated in immense energy, and of a ready and convincing eloquence, which he could make available for whatever opinions he thought it prudent to adopt; and, if he did not form his opinions solely with a view to his advancement, they certainly adapted themselves in each case with remarkable appropriateness to the different emergencies and turning points of his life. His works were collected after his death, and published in three volumes in 1622-23.

DUPIN, ANDRE MARIE JEAN JACQUES (1783-1860), commonly called Dupin the Elder, a celebrated French advocate, president of the Chamber of Deputies and of the Legislative Assembly, was born at Vassy, in Nièvre, on the 1st February 1783. He was educated by his father, who was a lawyer of eminence, and at an early age he became principal clerk of an attorney at Paris. On the establishment of the Académie de Législation he entered it as pupil from Nièvre. In 1800 he was made advocate, and in 1802, when the schools of law were opened, he received successively the degrees of licentiate and doctor from the new faculty. He was in 1810 an unsuccessful candidate for the chair of law at Paris, and in 1811 he also failed to obtain the office of advocate-general at the court of cassation. About this time he was added to the commission charged with the classification of the laws of the empire, and, after the interruption caused by the events of 1814 and 1815, was charged with the sole care of that great work. When he entered the Chamber of Deputies in 1815 he at once took an active part in the debates, and strenuously opposed the election of the son of Napoleon as emperor after his father's abdication. At the election after the second restoration Dupin was not re-elected. He defended with great intrepidity the principal political victims of the reaction, among others, in conjunction with Berryer, Marshal Ney; and in October 1815 boldly published a tract called Libre Défense des Accusés. In 1827 he was again elected a member of the Chamber of Deputies, and in 1830 took part in counselling the revolution, and in exhorting the citizens to resistance. In August of that year he became a member of Louis Philippe's cabinet, and more than any one else contributed to the formation of the new régime. At the end of 1832 he became president of the chamber, which office he held successively for eight years. On Louis Philippe's abdication in 1848 Dupin introduced the young count of Paris into the chamber, and proposed him as king with the duchess of Orleans as regent. This attempt failed, as Dupin submitted to circumstances, and, retaining the office of procureur-général, his first act was to decide that justice should henceforth be rendered to the "name of the French people." In 1849 he was elected a member of the Assembly, and became president of the principal committee—that on legislation. After the coup d'état of 2d December 1851 he still retained his office of procureur-général, and did not demit it till it was given to the decrees confiscating the property of the house of Orleans. In 1857 he was offered his old office by the emperor, and accepted it, explaining his acceptance in a discourse, a sentence of which may be employed to describe his whole political career. "I have always," he said, "belonged to France and never to parties." He died 8th November 1865. Among Dupin's works, which are numerous, may be mentioned Principes Juris Civilis, 5 vols. (1806); Mémoires et plaidoyers de 1806 au 1er Janvier 1850, in 20 vols.; and Mémoires ou souvenirs du barreau, in 4 vols. 1855-56.
DUPONT, PIERRE (1721-1751), a French song-writer of great popularity, the son of a workman of Tours, was born at Lyons, his mother's native city, but brought up from childhood under the care of an elderly cousin who occupied the position of priest of Roche-Tailleuse-sur-Scène. From the seminary of Largentière, where his education was completed, he passed to the general drudgery of a lawyer's and banker's office, in 1739 found his way to Paris and got some of his poems inserted in the Gazette de France and the Quotidienne, and two years later was saved from the conscription and enabled to publish his first volume—Les deux Anges—through the exertions of a Thomas kin-maman and M. Lebrun. The prize founded by M. de Mailly, La Tour-Landry was awarded to him in 1842, and he was employed for some time in connection with the Academy's great dictionary. The thought of trying his fortune as a writer for the stage was taking shape in his mind, when in 1847 the success of his pleasant song Jusqu'ont grande langue dans mon étable opened up another prospect of fame, and from that date to his death he confined himself mainly, though not exclusively, to the cultivation of his lyrical poetry. Accompanied, as they often were, by airs of his own invention, many of his songs became in the west so popular that they were equally welcome in the workshop and the drawing-room. His sympathies were much less, however, with the drawing-room than the workshop, and in 1851 he paid the penalty of having become the poet laureate of the socialist aspirations of the time by being condemned to seven years of exile from France. The sentence was cancelled, and the poet withdrew for a season from participation in politics. He died at Paris in 1871.

His lyrical poems may very fairly be arranged according to his own classification—rural and, as far as the writer is concerned, objective, legendary and subjective, patriotic and contemporaneous. They have appeared in various forms—Chants et Chansons, 3 vols., with music, 1852-54, Chants et Poèses, 7th edition, 1862, &c. Among the best known are Le braconnier, Le tourneur, Le vol de l'hirondelle, La chanson du bœuf, but many others might be mentioned of equal merit, natural, bold, delicate, and poignant. Dix événements, 1864, Fin de la Polycrace, 1847, La trahison du jofre avocat, 1862, written to accompany Dore's engravings, and Musée jules, 1850, are separate publications.

See Sainte-Beuve, Cours de légende, vol. iv, where an interesting description is given of the style in which the author sings his own songs in the clubs and political meetings, Ch. Baudelaire, Nanteau les Paris, 1849, Dognan, Dernier, 1851. Dupont de l'Eure Jacques-Charles (1757-1855), a French lawyer and statesman, was born at Neubourg, in Normandy, on the 27th February 1757. In 1789 he was an advocate at the Parliament of Normandy. During the republic and the empire he filled successively judicial offices at Lournes, Rouen, and Epernay. He had adopted the principles of the Revolution, and in 1793 he commenced his political life as a member of the Council of Five Hundred. In 1813 he became a member of the Corps Legislatif. During the Hundred Days he was vice-president of the Chamber of Deputies, and when the allied armies entered Paris he distinguished himself by the firmness with which he asserted the necessity of maintaining the principles of government that had been established at the Revolution. A resolution to that effect which he moved in the chamber was adopted, and he was chosen one of the commissioners to negotiate with the allied sovereigns. From 1817 till 1849 he was untrammelled a member of the Chamber of Deputies, and he acted consistently with the liberal opposition, of which at more than one crisis he was the virtual leader. For a few months in 1830 he held office as minister of justice, but, finding himself out of harmony with his colleagues, he resigned before the close of the year and
1814 Dupont became secretary to the Provisional Government, and on the restoration he was made a councillor of State. The return of the emperor in 1815 determined him to quit France, and he spent the close of his life with his two sons, who had established a powder manufactory in the state of Delaware. He died near Wilmington, Delaware, on the 6th August 1817.

DUPUIS's most important works, besides those mentioned above, were his De l'origine et des propriétés d'une science nouvelle (London and Paris, 1767), Phycologie, ou constitution naturelle du gouvernement le plus avantageux au genre humain (Paris, 1789), and his Observations sur les effets de la liberté du commerce des grains (1790). Dupont was a member of the Institute of France, to which he contributed many papers.

DUPUIS, CHARLES FRANÇOIS (1742-1809), an eminent French scientific writer, was born of poor parents at Tryé-Chateau, between Gisors and Chaumont, October 26, 1742. His father, who was a teacher, instructed him in mathematics and law-surveying. While he was engaged in measuring a tower by the geometric method the Due de Beauséjour, whom he employed in preparing his views on the subject of geometry, gave him a library in the college of Harcourt. Dupuis made such rapid progress in his studies that, at the age of twenty-four, he was appointed professor of rhetoric at the college of Luneux, where he had previously passed as a licentiate of theology. In his hours of leisure he applied himself to the study of the law, and in 1770 was admitted an advocate before Parliament. Two university discourses which he delivered, one on occasion of the distribution of prizes, and the other on the death of the empress Maria Theresa, having been printed, were admired on account of their elegant Latinism, and laid the foundation of the author's fame as a writer. His chief attention, however, was devoted to mathematics, the object of his early studies; and for some years he attended the astronomical lectures of Lalande, with whom he formed an intimate friendship. In 1778 he constructed a telegraph on the principle suggested by Amontons, and employed it in keeping up a correspondence with his friend M. Fortin in the neighbouring village of Bagneux, until the Revolution rendered it necessary that he should destroy his machine to avoid suspicion.

Much about the same time, Dupuis formed his ingenious theory with respect to the origin of the Greek months. In the course of his investigations upon this subject Dupuis composed a long memoir on the constellations, in which he endeavoured to account for the want of any resemblance between the groups of stars in the heavens and the names by which they are known, by supposing that the zodiac was, for the people who invented it, a sort of calendar at once astronomical and rural, and that the figures chosen for the constellations were such as would naturally suggest the agricultural operations of the season. It seemed only necessary, therefore, to discover the clime and the period in which the constellation of Capricorn must have arisen with the sun on the day of the summer solstice, and the vernal equinox must have occurred under Libra. It appeared to Dupuis that the clime was Upper Egypt, and that the perfect correspondence between the signs and their significations had existed in that country at a period of between fifteen and sixteen thousand years before the present time; that it had existed only there; and that this harmony had been disturbed by the effect of the precession of the equinoxes. He therefore ascribed the invention of the signs of the zodiac to the people who then inhabited Upper Egypt or Ethiopia. This was the basis on which Dupuis established his mythological system, and endeavoured to explain the subject of fabulous history, and the whole system of the theology and theology of the ancient world.

Persuaded of the importance of his discoveries, which, however, were by no means entirely original, Dupuis...
published several detached parts of his system in the Journal de Sciences for the months of June, October, and December 1777, and of February 1781. These he afterwards collected and published, first in Lalande's Astronomy, and then in a separate volume in 4to, 1781, under the title of Mémories sur l'Éryxwall des Considérations de l'Éryxwall. The theory propounded in this memoir was refuted by Baily, in the fifth volume of his History of Astronomy, but, at the same time, with a just acknowledgment of the erudition and ingenuity exhibited by the author. Conдорект proposed Dupuy to Frederick the Great of Prussia as a fit person to succeed Thebault in the professorship of literature at Berlin, and Dupuy had accepted the invitation, when the death of the king put an end to the engagement. The chair of humanity in the college of France having become vacant by the death of Bopin, it was conferred on Dupuy, and in 1788 he became a member of the Academy of Inscriptions. He now resigned his professorship at Lisseux, and was appointed by the administrators of the department of Parme one of the four commissioners of public instruction. At the commencement of the Revolutionary troubles Dupuy sought an asylum at Evreux, and, having been chosen a member of the National Convention by the department of Seine-et-Oise, he distinguished himself by the moderation of his speeches and public conduct. In the third year of the republic he was elected secretary to the Assembly, and in the fourth he was chosen a member of the Council of Five Hundred. After the memorable 18th Brumaire he was elected by the department of Seine-et-Oise a member of the legislative body, of which he became the president. He had been proposed as a candidate for the senate when he resolved to abandon politics, devoting himself during the rest of his life to his favourite studies. He died September 29, 1809.

In 1794 he published the work by which he is best known, entitled Du genre des Animaux, ou le Regnum Animal in 18 (1, or 12 vols 12mo). Though its circulation was small, it became the subject of much bitter controversy, and the theory propounded as to the origin of mythology in Upper Egypt led to the expedition organized by Napoleon for the exploration of that country. In 1799 Dupuy published an abridgment of his work in one volume 8vo, which met with no better success than the original. Another abridgment of the same work, executed upon a much more methodical plan, was published by M. de Tien, in two volumes 4to, inserted in the Memoirs of the Institute, a memoir "On the Zodiac of Tiberius (1637) published in the Revue Philosophique for May 1808, and a Mémorie Explicative du Zodiaque Chorologique et Mythologique published the same year, in one volume 4to. M. Dacier, secretary to the third class of the Institute, delivered his eulogy, and an historical account of his life and writings was published by his widow.

DUPUYTREN, Guillaume, Baron (1771-1825), one of the most distinguished French anatomists and surgeons, was born October 6, 1771, at Peure Butière, a small town of Normandy. He was sprung from poor parents, and was furnished with the means of receiving an ordinary education at the Collège de la Marche by some charitable persons to whom he had been introduced. At the newly established École de Médecine, under Fourcroy, he began the study of medicine with great diligence, and was appointed by competition prosecutor of the faculty when only eighteen years of age. His early studies were directed chiefly to morbid anatomy, which he did much to establish on a scientific basis, though many of his theories were ungrounded. In 1800 he was appointed assistant-surgeon at the Hotel-Dieu, and he was appointed professor of operative surgery in succession to Sabattier in 1811. In 1815 he was appointed to the chair of clerical surgery, and three years later he became head surgeon at the Hôtel-Dieu. Many other offices were conferred upon him; he became inspector of the university, a chevalier and afterwards an officer in the Legion of Honour, chevalier of St Michel, baron, member of the Institute, and first surgeon to the king. Dupuytren's energy and industry were admirable. He visited the Hotel-Dieu morning and evening, performing at each time several operations, lectured to vast throngs of students, gave advice to his out-door patients, and fulfilled the duties consequent upon one of the largest practices of modern times. By his indefatigable activity he amassed a fortune of £300,000, the bulk of which he bequeathed to his daughter, with the deduction of considerable sums for the endowment of the anatomical chair in the École de Médecine, and the establishment of a benevolent institution for distressed medical men. The most important of Dupuytren's writings is its Traitement des Articulations, in which the principles laid down by John Hunter are happily applied. In his operations he was remarkable for the skill and dexterity with which he overcame the numerous difficulties incidental to so extensive a practice as he enjoyed. He had complete control over his feelings, and great readiness of resource. Instead of attempting to introduce new methods of procedure, he commonly limited himself to modifying and adapting to his particular exigencies the established laws of surgery. He was thus led to invent several new surgical instruments. In private life Dupuytren was cold and reserved, and this was perhaps increased by his constant struggle against a consumptive tendency, which ultimately carried him off, 8th February 1835. In November 1853 he had suffered a slight shock of apoplexy, but he continued in practice almost until the day of his death.

DUQUESNE, Abraham, Marquis (1610-1688), one of the most distinguished naval officers in the history of France, was born at Dieppe in 1610. Born in a strong seaport, the son of a distinguished naval officer, he naturally adopted the profession of a sailor. He spent his youth in the merchant service, and obtained his first distinction in naval warfare by the capture of the Island of Lermia from the Spaniards in May 1637. About the same time his father was killed in an engagement with the Spaniards, and the news raised his hatred of the national enemy to the pitch of a personal and hotter animosity. For the next five years he sought every opportunity of inflicting further humiliation on the Spanish navy, and he distinguished himself by his bravery in the engagement at Gattari (1658), the expedition to Coruña (1630), and in battles at Tarragona (1641), Barcelona (1643), and the Cape of Good Hope. The French fleet, being left unoccupied during the minority of Louis XIV., Duquesne obtained leave to offer his services to the king of Sweden, who gave him a commission as vice-admiral in 1643. In this capacity he defeated the Danish fleet near Gottenburg and thus raised the siege of the city. The Danes returned to the struggle with increased forces under the command of King Christian in person, but they were again defeated,—their admiral being killed and his ship taken. Peace having been concluded between Sweden and Denmark in 1645, Duquesne returned to France. The revolt at Bordeaux, supported as it was by the naturalists from Spain, gave him the opportunity of once serving his country and gratifying his long cherished hatred of the Spaniards. In 1650 he fitted out at his own expense a squadron with which he blockaded the mouth of the Gironde, and compelled the city to surrender. For this service he was promoted in rank, and received a gift of the castle and isle of Indre, near Nantes. Peace with Spain was concluded in 1659, and for some years afterwards Duquesne was occupied in endeavours to suppress piracy in the Mediterranean. On the revolt of Messina from Holland, he was sent to support the insurgents, and had to encounter the united fleets of Spain and Holland under the command of the celebrated Admiral De Ruyter.
After several battles, in which the advantage was generally on the side of the French, a truce was arranged and took place near Cutania, on 20th April 1676, when the Dutch fleet was totally routed and De Ruyter mortally wounded.

The greater part of the defeated fleet was afterwards burned in the harbour of Palermo, where it had taken refuge, and the French thus secured the undisputed command of the Mediterranean. For this important service Duquesne received a letter of thanks from Louis XIV., together with the title of marquis and the estate of Bouchet. Owing to his being a Protestant, however, his professional rank was not advanced. His last achievements were the bombardment of Algiers (1822-3), in order to effect the delivery of the Christian captives and the bombardment of Genoa in 1824. On the revocation of the Edict of Nantes Duquesne lost his commission, but he was specially excepted from banishment. He died at Paris on 2d February 1688.

DURAN, Augustus (1759-1862), one of the leaders of the literary movement in Spain during the present century, was born at Madrid, where his father held the post of court physician. He lost his mother in childhood, and, instead of being educated in the capital, was sent to the seminary at Vergara, rather to gain strength and health than such mathematics and Latin as his clerical teachers could supply. Thence he returned a firm believer in ghosts, and erudite in the traditions of Spanish romance. In 1817 he joined the university of Seville for the study of philosophy and law, and in due course was admitted an advocate at Valladolid. From 1821 to 1823 he held a post in the dirección general de estudios at Madrid; but in the latter year he was discarded on account of his political opinions, and it was not till 1834 that he received a new appointment as secretary of the board for the censorship of the press, shortly afterwards supplemented by a post in the National Library at Madrid. The revolution of 1840 again led to his dismissal; but he recovered his position in 1843, and in 1854 attained the rank of director of the library. Next year, however, he retired, and the rest of his life was devoted to his literary work. He died in 1862. It was in 1829, shortly after his first discharge from office, that he published his discourse on the influence which modern criticism had exercised on the ancient Spanish theatre (Discurso sobre el inftajo que ha tenido la critica moderna en la decadencia del teatro antiguo); and, though the work was anonymous, it produced a marvellous effect on the tendencies of the national drama. He next endeavoured to make better known to his fellow-countrymen those half-forgotten treasures of their literature, in the collection of which he had spared neither money nor toil. Five volumes of a Romancero general appeared from 1828 to 1832 (republished, with considerable additions and improvements, in 2 vols. 1849-1851), and Talca española, or a collection of old Spanish comedies, in 3 vols, in 1834. As an original poet the author is best known by a poem in imitation of the style of the 15th century, entitled Las tres toronjas del verdol de amor, or "The Three Citron Trees of the Orchard of Love."

DURANDUS, Willelmus (1237-1296), otherwise Durante or Duranti, was born at Pulimin, sometimes written Pulmoisin, a small town in the diocese of Beziers, in Languedoc, whence he is sometimes described as a native of Provence. He studied law under Bernardus of Parma, in the university of Bologna, where he was promoted to the degree of doctor. He shortly afterwards migrated to the University of Modena, where he became so famous by his lectures on the canon law that he attracted the notice of Pope Clement IV., who appointed him auditor of the palace, and subsequently subdeacon and chancellor. In 1274 he accompanied Pope Gregory X. as his secretary to the Council of Lyons, which is reckoned as the fourteenth general council, and under the pontificates of several subsequent popes filled highly responsible offices. He was a work of 1278 spiritual and temporal legate of the patrimonis of St Peter under Pope Nicholas III., and in 1278 took possession, in the name of the same Pope, of the provinces of Bologna and Romagna. In 1281 Pope Martin IV. named him vicarapo spiritual, and in 1283 governor of the temporalities of the two provinces, in which office he had the direction of the war against the rebellious province of Romagna. The town of Castrum Riparum Urbanianum having been burnt down during the war, he rebuilt it, and renamed it Castrum Durantis. Pope Urban VIII. subsequently gave to this town the name of Urbania, which it bears in the present day. Pope Honorius IV. returned Durandus in the same offices until the end of 1286, when his election to the bishopric of Meude, in Languedoc, was the occasion of his retiring for a short time from the conduct of civil affairs.

Durandus, however, appears to have remained in Italy, and to have revised at this time several of his works. He refused in 1286 the archbishopric of Ravenna, which was offered to him by Pope Boniface VIII., and accepted in preference the more arduous office of governor of the province of Romagna and of the march of Ancona. The party of the Ghibellines, however, carried on hostilities against the Holy See with so much vigour that he found his strength unequal to the exigencies of government; and, having resigned his post, he retired to Rome, where he died on 1st November 1296.

Durandus was the author of several very learned works. The most famous of them is his Speculum Iudiciale. This work is entitled in the printed copies, the earliest of which was published at Rome in folio in 1474, as Speculum Juriae, but all the MSS. bear the title of Speculum Iudiciale, and Durandus himself, in his epistle dedicatory to Cardinal Ottobono Passo, afterwards Pope Adrian V., describes it under this latter title. It is a practical treatise on civil and canon law, and it earned for its author, when young, the surname of the Father of Practice. Durandus is said to have completed it in 1274, at the age of thirty-four, and he revised it some time between 1287 and 1291. It has since been such an acquisition of its time. As Durandus himself drew up the Decretals, which after his death were inserted in the Sextus. Durandus also wrote a commentary on the decretales of Pope Nicholas III., which is only known to us from the epitaph on his tomb, as preserved by Sarti, and which enumerates all his chief writings, amongst which may be mentioned his Speculum Legisaurum, inserted in the Speculum Judiciale, his Edizione Dissertationum Officiorum, which has passed through many editions, the earliest of which was printed at Brescia in 1490, and a copy of which is stated was in the library of Abbe Pascal Bataille, who have been scrawled from his Pontificale Patrum, being a treatise on the duties of bishops, preserved in the National Library of Paris. Durandus the Speculator is sometimes confounded with Durandus of Acre, who, under the name of Dominico, bishop of Meaux, who died in 1332, and was the author of two treatises, De Jurisdictionibus and De Legibus, and with William Durandus, his own nephew, who was living in 1308 and wrote De modo celebrandi Canonia, and who died in Cyprus in 1328.

DURANGO, a town of Spain, in the province of Biscay 16 miles south-east of Bilbao, at the confluence of the Durango and the Mafaria. As a military position of some importance it is often mentioned in history. The town of Pedro de Tavira is one of the earliest in the Biscayan district; and that of Santa Ana has some interesting altars constructed by Ventura Rodriguez in 1774. The inhabit-
DUR-DUR

...ants, who number about 2600, are partly engaged in the manufacture of iron and steel, and carry on a trade with Hamburg in chestnut. The foundation of the town is ascribed to the early kings of Navarre, and in 1158 it obtained the rank of a countyship. The decree by which Don Carlos in 1839 ordered all foreigners taken in arms against him to be shot was issued from Durango.

DURANGO, sometimes called Ciudad Victoria, or Guadalupe, a city of Mexico, the capital of the state of Durango, lies near the foot of the south eastern slope of the Sierra Madre, at a height of 6487 feet above the sea, in 24° 25' N lat and 102° 55' W long. It is the centre of a Roman Catholic bishopric, and possesses a cathedral, ten parish churches, a hospital, Government-buildings, a penitentiary, a state prison, a bull-ring, and a large cock-pit. Formerly the seat of a Jesuit college, it still maintains an episcopal seminary, and an institute with literary, legal, and scientific departments. It is well supplied with water by thermal and other springs, which not only satisfy the demands of nine public baths, but also fill considerable channels along the streets. Trade is carried on with the northern and north-western states, and, besides a mint, a gold refinery, and other offices connected with the mining operations, there are glass works, printing-presses, and factories for cotton and woollen goods, leather, and tobacco. Durango was founded in 1559 or 1560 by Alonso de Echeveria, an officer of the Viceroy Velasco, as a military post for the control of the Chichimecas. It was soon after made an episcopal see, but did not attain any great importance till the discovery of the rich deposits of Guarrasowe, and most of its public buildings were erected at the expense of Zambruno, the owner of the mines. In 1783 it had no more than 8000 inhabitants, about 1850 they were estimated at 30,000 or 40,000, in 1868 they were reduced to 12,449.

DURANTE, Francesco, a celebrated Italian composer, and one of the founders of the so-called Neapolitan school of music, was born at Frattamaggiore, in the kingdom of Naples, and not, as has been erroneously stated, in the city of that name. The date of his birth is generally given nine years too late. In reality he was born on March 15, 1684. At an early age he entered the Conservatorio dei poveri di Gesù Cristo, at Naples, where he received lessons from Gaetano Greco, but soon he attracted the attention of the celebrated Alessandro Scarlatti, at that time the head and ornaments of another great music school of Naples, the Conservatorio di St Ondoro. Under his guidance Durante studied for a considerable time, and left him only to go to Rome, where, during further five years, he completed his vocal studies under Fétis. On his return to Naples he obtained the position of chapel-master at the school of St Ondoro, which he occupied till 1742, when he succeeded Porpora as head of the Conservatorio Santa Maria di Loreto, also at Naples. This post he held for thirteen years, till his death in 1755. His fame as a teacher was all but unrivalled, and the most celebrated masters of the earlier school of Italian opera are amongst his pupils. Only Jamelli, Pasdelou, Perugio, Pecchi, and Vincenzo may be mentioned here. Under him the Neapolitan school of music reached its climax of celebrity, and it was in this school that the great traditions of Italian vocal art were established, the last remnants of which are rapidly disappearing. His manner of working, in writing all but exclusively of sacred compositions, was presented by Savorgnà, a Neapolitan lover of art, to the Pari library. A catalogue of it may be found in Fétis's Biographie Universelle. The imperial library of Vienna also preserves a valuable collection of Durante's manuscripts. Two requiems, several masses (one of which, a most original work, is the Pastoral Mass for four voices), and the Lamentations of the Prophet Jeremiah are amongst his most important settings.

DURÃO, José de Santa Bárbara, a Brazilian poet, was born at Mariana, in the province of Minas Gerais, in 1737, and died at Lisbon in 1784. He studied at Coimbra, in Portugal, graduated as a doctor of divinity, became a member of the Augustan order of friars, and obtained a great reputation as a preacher. Having irritated the minister Fombal by his defence of the Jesuits, he retired from Portugal, and, after being imprisoned in Spain as a spy, found his way to Italy, where he became acquainted with Alios, F品德monte, Casti, and other literary men of the time. On his return to Portugal he delivered the opening address at the university of Coimbra for the year 1782, but soon after retired to the clusters of a Grattan convent. At the time of his death he taught in the little college belonging to that order in Lisbon. His principal poems, entitled Carasia, or, poema eposo do descrevimento da Bahia, appeared at Lisbon in 1781, but proved at first a total failure. Its value has gradually been recognized, and it now ranks as one of the best poems in Brazilian literature—remarkable especially for its fine descriptions of scenery and native life in South America. The historic institute of Rio de Janeiro offered a prize to the author of the best essay on the legend of Caraimura, and the successful competitor published a new edition of Durão's poem. There are two French translations, one of which appeared in 1829 in 3 vols 8vo.

See Adolfo de Varnhagen, Epoca Beneficen, 1845, Pereira da Silva, Os Varios Lisadores do Brazil, 1858, Wolf, Le Brasil litteraire, Berlin, 1863.

DURAZZO, the ancient Dyrrachium, or Epidamnum, in Turkish Dratsh, and in Slavonian Drantze, was an old Ionian city of European Turkey, in Albania, about fifty miles south of Scutari, on the eastern shore of the Adriatic. It is the seat of a Roman Catholic bishop and a Greek archbishop, but in every respect has greatly declined from its former prosperity. The walls are dilapidated, plantain trees are growing on the gigantic ruins of its old Byzantine citadel, and its harbour, once equally commodious and safe, is gradually becoming silted up. The only features worthy of notice are the quay, with its rows of cannon, and the bridge, 750 feet long, which leads a colony of Turks across the mouth of the coast. Such trade as it still possesses is mainly carried on with Trewon, and consists in the export of grain, skins, wool, wood, and leeches. The population is estimated at 9600.

DURBAR, or more correctly DURBAN, a town of South Africa, in Natal, in the county of Durban, situated on a sandflats about a mile to the north of the bay of Port Natal, in 29° 52' S lat, and 31° 2' E long. It is well laid out with wide tree-shaded streets, carries on a considerable export and import trade, and possesses an Episcopal church, two Wesleyan chapels (one for natives and the other for Europeans), a Government school, a prison, a custom-house, a literary institution, and an agricultural and horticultural society. Durban was founded in 1834 as the capital of the republican colony of Victoria and Natal, its name was bestowed in honour of Sir Benjamin D'Urban, the governor of the Cape. The population, mostly English, was in 1866, 4991.

DUREN, a town of Prussia, at the head of a circle in the province of the Rhine, on the right bank of the Poer at a railway junction eighteen miles east of Aix-la-Chapelle. Besides two Roman Catholic and two Protestant churches, it possesses three nunneries, a gymnasium, a mining school, and a blind asylum—the Elizabeth Institution—which was
founded in 1845 and in 1863 was made a provincial establishment. Woollen goods, paper, and needles were manufactured on an extensive scale, and flax-spinning, felt-weaving, wire-weaving, macramé, and zino-rolling are also carried on.

Durer is probably to be identified with the Marodurum of the Ubi, where they were defeated by Cottius in 49 B.C. It was from Cottius, the rank of an provincial city, and its claims were confirmed by Rupert in 1407. Paused by Frederic 11. to Count William of Juliers as security for the payment of a debt, it was ultimately incorporated with the duchy of Juliers. Its name frequently occurs in the history of the Palatinate. Population in 1873, 14,512.

DURER, ALBRECHT (1471-1528), was born at Nuremberg on the 21st of May 1471; he was therefore six years older than Titian and twelve years older than Raphael. In the history of art, Albert Durer has a name equal to that of the greatest of the Italians. North of the Alps, his only peer was Holbein. But Holbein was not born till 1497, and lived after 1535, principally in England; hence in youth he came within the influence of the already matured arts of Italy, and in manhood his best powers were concentrated on the painting of portraits in a foreign country. Durer lived a German among Germans, and is the true representative artist of that nation. All the qualities of his art取决于 the combination of the warmth of the South, with a Reformation of the mind. He was, indeed, first of all a painter; and though in his methods he was too scrupulous and laborious to produce many great works, and though one of his greatest, the Assumption of the Virgin, has been destroyed by fire, and another, the Feast of Rose-Garlands, has suffered irreparable injury and repair, yet the paintings which remain by his hand are sufficient to place him among the great masters of the world. He has every gift in art except the Greek and the Italian gift of beauty or ideal grace. In religious painting, he has profound earnestness and humanity, and an inexhaustible dramatic invention; and the accessory landscape and scenery of his compositions are more richly conceived and better studied than any painter before him. In portrait, he is equally master of the soul and body, rendering every detail of the human superficies with a microscopic fidelity, which nevertheless does not encumber or overlay the essential and inner character of the person represented. Still more if we judge him by his drawings and studies, of which a vast number are preserved in private as well as public collections, shall we realize his power in grasping and delineating natural face and character, the combined gravity and minuteness of his style, the penetration of his eye, and the almost superhuman patience and accuracy of his line in drawing, whether from persons, animals, plants, or landscape, whether with pen, pencil, charcoal, or (which was his favourite method) in colour with the point of the brush. But neither his paintings nor his drawings could by themselves have won for him the immense popular fame and authority which have been his from his own time to ours; that fame and that authority are due to his pre-eminence in the most popular and democratic of the arts, that of which the works are accessible to the largest number, the art of engraving. In an age which drew a large part of its intellectual nourishment from engraving, Durer furnished the most masterly examples both of the refined and elaborate art of the metal engraver, as well as the most striking inventions for the robust and simple art of the wood engraver.

The town of Nuremberg in Franconia, in the age of Durer, was a home most favourable to the growth and development of its arts. Of the free imperial cities of central Germany, none had a greater historic fame, none a more settled and patriotic government, none was more the favourite of the emperors, none was the seat of a more active
and flourishing commerce. Nuremberg was the great mart for the merchandise that came to central Europe from the East through Venice and over the passes of the Tyrol. She held not only a close commercial intercourse, but also a close intellectual intercourse, with Italy. Without being so far forward as the neighbour city of Augsburg to embrace the intellectual fashions of the Italian Renaissance, yet, continuing to be profusely imbued with the old German burgher spirit, and to wear, with an evidence which is almost unimpaired to this day, the old German civic aspect, she had imported, before the close of the 15th century, much of the new learning of Italy, and numbered among her citizens a Willibald Pirckheimer, a Sebastian Schreyer, a Hartmann Schedel, and others fit to hold a place in the first rank of European humanists. The life into which Albert Durer was born was a grave, a devout, a law-loving, and a lettered life, in the midst of a community devoted to honourable commerce and honourable avocations, proud of its past, proud of its wealth, proud of its liberties, proud of its arts and ingenuities, and abounding in aspects of a quaint and picturesque dignity. His family was not of Nuremberg descent, but came from the vale of Eyta in Hungen. The name, however, was German, and the family bearing—an open door—points to an original form of Thürer, meaning a maker of doors, or carpenter. Albrecht Durer the elder was a goldsmith by trade, and settled soon after the middle of the 15th century in Nuremberg. He served as assistant under a master goldsmith of the city, Hieronymus Holper, and presently married his master's daughter, Barbara. This was in 1468, the bridegroom being forty and the bride fifteen years of age. They had eighteen children, of whom Albert was the second. The elder Durer was an esteemed citizen, and was possessed of an immense family, but living in virtue and honour to the end of his days. The accounts we have of him proceed from his illustrious son, who always speaks with the tenderest reverence and affection of both his parents, and has left a touching narrative of the deathbed of each. He painted the portrait of his father twice, once about 1490, the second time in 1497. The former of these two pictures is in the Uffiz at Florence, the latter, well known by Holbein's engraving, is in the possession of the Duke of Northumberland. A third "Portrait of his Father" by Durer, in the gallery at Frankfort, is probably so called in error. The young Albert was the second. He was the second of the Tyrolian family. In learning, he was at the age of fifteen and a half apprenticed for three years to the principal painter of the town, Michael Wolgemuth. Wolgemuth furnishes a complete type of the German painter of that age. At the head of a large shop, he had numerous assistants, his business was to turn out, generally for a small price, devotional pieces commissioned by mercantile corporations or private persons to decorate their chapels in the churches,—the preference being usually for scenes of our Lord's Passion, or for tortures and martyrdoms of the saints. In work of this class, the painters of upper Germany before the Renaissance show considerable technical knowledge, and a love of rich and quaint costumes and of landscape, but in the human part of their representations often a grim and debased exaggeration, transgressing all bounds in the grotesqueness of undignified caricature.

Wolgemuth and his assistants also produced woodcuts for book illustration, and probably—though this is a vexed question—engravings on copper. In this school Durer learnt much, by his own account, but suffered also not a little from the roughness of his companions. At the end of his term under Wolgemuth, he entered upon the usual course of travels—the Wunderjahre—of a German youth. The direction of these travels we cannot retrace with certainty. It had been at one time his father's intention to apprentice him to Martin Schongauer, of Colmar in Alsace, incomparably the most refined German painter and engraver of his time. To Colmar, among other places, Albert Durer went in the course of his travels; but Schongauer had already died there in 1488. We also hear of him at Strassburg. It is a moot point among biographers whether towards the end of his Wunderjahre—about the year 1494—the young Durer did or did not cross the Alps to Venice. On the one hand it is argued that he did, first, because, on the occasion of an undoubted visit to Venice in 1506, he speaks of admiring no longer that which he had vastly admired "eleven years before," secondly, because several careful drawings by his hand from the engravings of Mantegna and other Italian masters, bearing the date of 1494, show that in this year he was making a special study of Italian art, and thirdly, because he has left a number of coloured drawings of the scenery of Tyrol, such as he would have to traverse on the road between Bavaria and Venice, and these show a technical finish and minuteness of execution, characteristic of his studies at this early period but not later. Those who do not believe in this early visit to Venice reply, first, that the allusion interpreted as above in Durer's correspondence is too vague and uncertain, and that what Durer, in 1506, had really "admired eleven years ago" was probably not the work of Venetians seen at Venice, but of a Venetian artist known as Jacopo de' Barbari, or Jacob Waltz, who resided about that time in Nuremberg, and who, we know, had a very considerable influence on the art of Durer; secondly, that the prints of Mantegna and other Italians, undoubtedly copied by Durer in 1494, may very well have been brought to Germany with other wares on sale from Venice, or have been shown him by the same Jacopo de' Barbari, and thirdly, that other landscapes, bearing the date of 1506 or 1507, do in fact show the same technical characters as those which are assigned, by the other side in the argument, to 1494. The question will probably remain open to the end. With reference, however, to the third head of the argument, the character of Durer's early landscape work, it has not been sufficiently observed that his ideal of scenery shows itself fully formed and developed by the time of the publication of his Apocalypse woodcuts and his earliest engravings on copper, that is, about the year 1497, that this ideal background, of a lake with castled and wooded headlands sloping down from either side, and slopes afflato in distance, is taken not from the neighbourhood of Nuremberg but from the northern borders of Tyrol—it is the scenery, not of the banks of the Tegnitz nor even the Danube, but rather of the Wurmsee or the Tegernsee, that to the Alps and lakes, therefore, of the Northern Tyrol, whether on his way to Venice or otherwise, Durer must certainly have come during these travels of his youth.

At the end of May 1494, being twenty-three years old, Albert Durer returned, at his father's summons, to his native Nuremberg, and within two months was married to Agnes, the daughter of a well-to-do merchant of the town named Hans Frey. It is probable that the marriage had been arranged between Hans Frey and the elder Durer while Albert was on his travels, and possible that a portrait of the young painter very much habited, executed by himself
in the previous year 1493, and showing him in the first bloom of that admirable manly beauty for which he was afterwards renowned, may have given him the good graces of the lady. Their marriage was childless. Agnes survived her husband. The petulance of an old friend of her husband's has unjustly blackened her reputation. Her name has for centuries been used to point a moral, and among the unworthy names of great men the wife of Dürer was as notorious as the wife of Socrates.

The origin of this tradition must be sought in a letter written a few years after Dürer's death by his close friend and lifelong companion, Willibald Pirckheimer, in which Pirckheimer accuses Agnes of having plundered her husband to death with her wanton ways, of having made him over-work himself for money's sake, of having given his latter days no peace. But a closer study of facts and documents shows that there is not a jot of evidence to support these spleenetic charges. Pirckheimer, when he made them, was old, broken with grief, and disgusted with the world, and the immediate occasion of his outburst was nothing more than a vagary of pique on the part of the widow because she had not let him have a pair of antlers—a household ornament much prized in those days—to which he fancied himself entitled out of the property left by Dürer. On the other hand, there is abundant evidence of the close confidence and companionship that subsisted between Dürer and his wife; she accompanied him on his journey to the Low Countries in 1521; after his death she behaved with peculiar generosity to his brothers; it is perfectly probable that Dürer had in her a kind and beloved as well as a careful partner; the old legend of her sufferings at her hands must be regarded as completely discredited. So far from being forced to toil for money to the end, he died well off, though he had in his latter years occupied himself more and more with unremunerative pursuits—with the theoretical studies of perspective, geometry, fortification, proportion, for which he shared the passion of Leonardo, and on which, like Leonardo, he has left written treatises.

For more than eleven years after his marriage, Dürer lived at Nuremberg the settled and industrious life of his profession. Within this period his masterly powers unfolded and matured themselves. Two important devotional pictures are attributed to his early practice; one a large triptych painted in tempera on linen, now in the gallery at Dresden, the other also an altar-piece with wings, now in the small palace of the archbishop of Vienna at Ober St Veit; both probably painted for the Elector Frederick of Saxony. These pictures have been executed, like those of Wohlgemuth, hastily, and with the help of pupils. (Of painters trained in the school of Dürer, we know the names and characters of Schaufelein, Sprungkobbe, Haan Baldung Grun, and Hans of Culmbach.) A finer, and somewhat later, example of the master's work in this class is the altar-piece painted for the family of Baumgartner, having a Birth of Christ in the centre and the figure of a knight on either side; this is now at Munich. The best of Dürer's engravings, both of mind and hand, must have been given in these days to the large number of engravings and woodcuts for the Apocalypse. The first edition illustrated with this series appeared in 1498. The Northern mind had long dwelt with eagerness on these mysteries of things to come, and among the earliest block-books printed in Germany is an edition of the Apocalypse with rude figures. But Dürer not only transcended all efforts made before him in the representation of these strange promises, terrors, and transformations, these thunamaturge visions of doom and redemption; the passionate energy and undismayed simplicity of his imagination enable him, in this order of creation, to reach the highest point of human achievement. The four angels keeping back the winds that they blow not; the four riders; the loosing of the angels of the Euphrates to slay the third part of men; these and others are creations of such force, such grandeur or tempestuous grandeur in the midst of grotesque and unutterable horror, as the art of no other age or hand has produced. At the same time, Dürer was practising himself diligently in the laborious art of copper engraving. In the years immediately about or preceding 1500, he produced a number of plates of which the subjects are generally fanciful and allegorical, and the execution is more or less tentative and uncertain. Of several of these, other versions exist by contemporary masters, and it is disputed in most of such cases whether Dürer's version is the original, or whether, being as that time young and comparatively unknown, he did not rather begin by copying the work of older men; in which case, the originals of such engravings would have to be sought in versions bearing other signatures than Dürer's. One signature of frequent occurrence on German engravings of this time, and among them, on several subjects which are also repeated by Dürer's hand, is the letter W. To the identity of this W, criticism is much divided. He has been generally identified with one Wenzel of Olmuts, whom we know to have engraved copies after Martin Schongauer and other masters. Others, again, attribute some at least of the prints signed W to Dürer's teacher Wohlgemuth, and when the same composition is found engraved by each of the two masters, conclude that the younger has copied the work of the elder. Instances are the subjects of the Four Naked Women with Death and the Fiend, the Old Man's Dream of Love; the Virgin and Child with the Ape, &c. The question is difficult to decide. It seems certain that the work of several different hands is signed with this same initial W; and we are of those who hold, that, of the engravers so signing, one, whether Wohlgemuth or not, is a very accomplished master, whose work Dürer, until near the age of thirty, was in the habit of occasionally copying. From another master, again, whose name we have already mentioned, the half Venetian half German Jacopo de' Barbari, Dürer learned much. The Italians had already begun to work out a science of the human structure and of ideal proportions; and from Jacopo de' Barbari, as Dürer himself tells us, he received in youth the first hints of this science, which he subsequently investigated for himself with his usual persistent industry. These early notions received from Jacopo de' Barbari led to one immediate result of value, the famous engravings of Adam and Eve published in 1504. The figures here, as we can see by many preparatory sketches, are planned on geometrical principles, not drawn—as was the common German custom, and Dürer's own in a large majority of his works—direct from the model, with all the crudities of the original faithfully delineated. The background of foliage and animals is a miracle of rich invention and faithful and brilliant execution; the full powers of Dürer as an engraver on copper are here for the first time asserted. In another elaborate engraving which probably soon followed this—the Great Fortune or Nemesis—the opposite principle is observed; above a stem (nothing ideal, there is the most literal and graceless commonness. In his own journals Dürer calls this plate Nemesis; it has been conjectured that the piece was composed in allusion to the unfortunate expedition sent by the emperor Maximilian to Switzerland, in which a number of Nuremberg citizens took part, with Pirckheimer at their head. In the meantime Dürer had been variously exercising his inexhaustible power of dramatic invention on the subjects of Christian story. He had completed the set of drawings of the Passion
of Christ, in white on a green ground, which is known as the Green Passion, and forms one of the treasures of the Albertina at Vienna. He had followed up his great woodcut series of the Apocalypse with preparations for another series on a similar scale, and had finished seven out of twelve subjects for the second known as the Green Passion, and sixteen out of twenty for the Life of the Virgin, when his work was interrupted by a journey which is one of the principal episodes in his life. In the autumn of the year 1505 he went to Venice, and stayed there until the autumn of the following year.

The occasion of this journey has been erroneously stated by Vasari. Dürer's engravings, having by this time attained a great popularity both north and south of the Alps, had begun to be copied by various hands, and among others by the celebrated Marcantonio of Bologna, then in his youth. According to Vasari, Marcantonio, in copying Dürer's series of the Little Passion on Wood, had imitated the original monogram, and Dürer, indignant at this fraud, set out for Italy in order to protect his rights, and having lodged a complaint against Marcantonio before the signory of Venice, carried his point so far that Marcantonio was forbidden in future to add the monogram of Dürer to copies taken after his works. This account will not bear examination. Chronological and other proofs show that such a suit was fought at all, it must have been in connection with another set of Dürer's woodcuts, the first sixteen of the Great Passion on Wood. Dürer himself, a number of whose familiar letters written from Venice to his friend Pulkheimer at Nuremberg are preserved, makes no mention of anything of the kind. Nevertheless something of the kind may probably have been among the causes which determined his journey. Other causes, of which we have explicit record, were an outbreak of sickness at Nuremberg, Dürer's desire, which in fact was realized, of finding a good market for the proceeds of his art; and the prospect, also realized, of a commission for an important picture from the German community settled at Venice, who had lately caused an exchange and warehouse—the Fondaco dei Tedeschi—to be built on the Grand Canal, and who were now desirous to dedicate a picture in a church of St. Bartholomew. The picture painted by Dürer on this commission was the Adoration of the Virgin, better known as the Feast of Roé-Garlands, it was subsequently acquired by the emperor Rudolph II., and carried as a thing beyond price upon men's shoulders to Vienna, it now exists in a greatly injured state in the cloisters of St. Bartholomew near Prague. It is one of Dürer's best conceived and most multitudinous compositions, and one in which he aims at rivalling the richness and playfulness of Italian art. Other pictures probably painted by him at Venice are Christ disputing with the Doctors, now in the Palazzo Barbarini at Rome, Christ Crucified, in the gallery at Dresden, and a Madonna and Child in the possession of Lord Lothian. These works of the German master were not without influence upon the Italian painters resident at Venice, an influence which we can distinctly trace in some of the early works of Titian. Dürer's letters testify to the high position he held at Venice, and speak of the jealousy shown towards him by some of the more saucy sort of artists, the friendship and courtesy by the nobler sort, and especially by the noblest of all, the veteran Giovanni Bellini. He had come to Venice with wealth in which he might live if he would consent to abandon home for Italy, of the Northern winter, and how it will make him shiver. Yet he resisted the seductions of the South, and was in Nuremberg again before the close of 1506. First, it seems, he had made an excursion to Bologna having in mind to take Mantegna to the way, in order to do homage to the old age of that Italian master. Andrea Mantegna, from whom he had himself in youth learnt the most. But the death of Mantegna prevented this purpose.

From the winter of 1506 until the summer of 1520, Dürer was again a settled resident in his native town. During these years his genius and his fortunes were at their height, except the darling existence of Raphael at Rome, the annals of art present the spectacle of no more honourable or enviable career. Dürer's fame had spread all over Europe. From Antwerp to Rome his greatness was acknowledged, and artists of less invention, among them some of the foremost on both sides of the Alps, were not ashamed to borrow from his work this or that striking combination or expressive type. He was on terms of friendly or friendly communion with all the first masters of the age, and Raphael held himself honoured in exchanging drawings with Dürer. In his own country, all orders of men, from the emperor Maximilian down, delighted to honour him, he was the familiar companion of chosen spirits among statesmen, humanists, and reformers, and had the power to bend to himself with the links of a more than brotherly friendship the leading citizen of the leading city of Germany, Willibald Pulkheimer. His temper and his life were singularly free from all that was jarring, jealous, or fistful.

The burgher life of even thus, the noblest German city, seems narrow, quiet, and hurh besides the grace and elegance and poetry of Italian life in the same and the preceding generation, but among its native surroundings, the career of Dürer stands out with an aspect of ideal elevation and decorum which is its own. He is even distinguished from his fellow citizens by the stately beauty of his aspect and the rich elegance of his attire. Every reader will be familiar with the portrait in which he has represented himself at this middle period of life—the nobly formed oval countenance, with the short beard, and the long carefully divided locks curling and flowing over either shoulder, the upright brow, the steadfast penetrating gaze of the large perfectly cut eyes, the long nose somewhat aquiline, and full perfectly cloven mouth, the strong delicate fingers playing with the rich fur laped of his cloak.

These years of Dürer's life can best be divided according to the several classes of work with which, during their succession, he was principally occupied. Dürer had written to his brother the Archdeacon Hein, a merchant of Frankfort, in 1502—this was afterwards replaced, at Frankfort, by a copy, and the original transported to Munich, where it perished by fire in 1674; and lastly, the Adoration of the Trinity by all the Saints, a composition of many figures commissioned for a chapel dedicated to All Saints in an almshouse for decayed tradesmen at Nuremberg, and completed in 1511—this is now one of the glories of the Belvedere at Vienna. In this same year, 1511, Dürer brought out his three great woodcut books in folio form together—the Apocalypse in a second edition with the German text, the Life of the Virgin for the first time complete. In 1513, he painted two pictures for his native town, the historical portraits of Charlemagne and the emperor Sigia.
mood, which are now to be seen in the Germanic Museum of Nuremberg. The two or three years next following this are for Dürer years, above all things, of engraving on metal. Of the sixteen pieces composing the Little Passion on Copper, perhaps the best invented and certainly the most brilliantly executed of all his gospel histories, ten were executed in 1512 and the last six in 1513. Of the many Devotional figures of the Virgin and Child cut on copper by Dürer at various times of his career, several of the most pathetic and carefully finished date from about the same time. Now, also, he began to repeat with greater persistency the experiment, which he had first tried some years before, of working by the method, then newly invented, of the etcher; that is, of biting the lines of his drawing with acid upon metal instead of cutting them with the burn. And these, again, are the years of those three master-pieces of his mind and hand, the Melancholia, The Knight with Death and the Devil, and the St. Jerome reading in his Cell. These engravings are too well known to need description. The first two, by their earnest and eminently significant, have fascinated minds of every class, and given rise to an infinity of discussion. It is nearly certain that in these three plates, of almost the same size, date, and manner of equal technical perfection, we have three out of four projected illustrations of the Human Tempers, as they were divided by medieval science—the Melancholic, the Sanguine, the Phlegmatic, and the Choleric. Melancholy being intended to stand at the head of the series (although it is dated 1515, and the Knight 1512), has the numeral I. written after the name Melancholia; the winged genius, in whom the qualities of this temperament are incarnated, is seated darkly musing among symbolic instruments of science. She seems an incarnation of the new spirit of the age, the spirit of solemn and resolve search. The subject of the Knight, being intended to illustrate the opposite type of the personage, in the life of this rude world, has seemed a type of the righteous man whom fate and retribution are about to overtake. And the subject of St. Jerome, the Father of the church to whom Renaissance Christianity turned with the greatest devotion, and whom the labours of Erasmus had made familiar in especial to the humanists of the North, serves as the natural type of the phlegmatic or student temperament. No fourth subject seems to have been attempted to complete the set. The reason of this may have been the call which at this time began to be made on Dürer's industry by another kind of work. The five years between 1514 and 1519 are devoted above all things to woodcut work, on commission from the emperor Maximilian, who had resided for some time at Nuremberg in 1512, and whose personal favour and friendship Dürer from that time enjoyed. With the learned cooperation of Johannes Stabius, he presently commenced a scheme of design for wood engraving in honour of Maximilian more soldiers of the Reformation, Franz von Sickengen; others as designating one of the most insidious and laborious than those of the period just preceding. In 1518 the Diet of Augsburg brought Maximilian to that city, and there Dürer was in attendance on him. A new portrait drawn in charcoal, and subsequently used for an engraving in wood, carries a note in the artist's handwriting to the effect that it was done from the emperor at Augsburg "in his little room up at the top in the palace.

In 1519 Maximilian died. In the next year the desire of Dürer to secure from his successors a continuance of the patronage and privileges granted during his lifetime, together with an outbreak of sickness in Nuremberg, gave occasion to the master's third and last journey from his home. On the 15th of July 1520 he set out for the Netherlands, with his wife and her maid, in order to be present at the coronation of the young emperor Charles V., and if possible to conciliate the good graces of the all-powerful regent Margaret. In the latter part of his aim Dürer was but partially successful. His diary of his travels enables us to follow his movements almost day by day. He travelled by the Rhine to Cologne, and thence by road to Antwerp, where he was splendidly received and lived in whatever society was most distinguished, including that of Erasmus of Rotterdam. Many portrait drawings of persons who sat to him in these days are preserved. Besides going to Antwerp for the coronation, he made excursions down the Rhine to Cologne and thence back overland by Herzogenbusch; to Brussels, to Bruges and Ghent; and to Zealand with the object of seeing a natural curiosity, a whale reported ashore. The vivid account of this last expedition given in his diary contrasts with the usual dry entries of interviews and disembarkements. A still more striking contrast is the passionate outburst of sympathy and indignation with which, in the same diary, he comments on the supposed kidnapping of Luther by foul play on his return from the Diet of Worms. Without being one of those who in his city took an avowed part against the old ecclesiastical system, and probably without seeing clearly whether the religious ferment of the time was tending—without, that is, being properly speaking a Reformer—Dürer in his art and all his thoughts was the incarnation of those qualities of the Teutonic character and the Teutonic conscience which resulted in the Reformation; and personally, with the fathers of the Reformation he lived in the warmest sympathy.

On the 12th of July 1521 Dürer reached home again. The remaining seven years of his life were occupied chiefly with the preparation of the scientific writings of which we have already spoken; with engraving on copper, in a style of consummate care and power, several portraits of his friends, among them the elector Frederick, Frickeimer, Erasmus, and Melanchthon; and with the execution of those two paintings by which, perhaps, his powers in this highest branch of his art are best known, the figures of St. Paul with St. Mark and St. John with Peter. These are now in the Munich gallery, and exhibit at their greatest Dürer's earnest and pregnant conception of character, with a majesty in the types and a grandeur in the gesture and drapery which in his earlier career he had never yet attained. Each apostle or evangelist represents a "temperament"—John the melancholic, Peter the phlegmatic, Paul the sanguine,
DUR-DUR

and M uk the cholerick, and it is characteristic of Durer's thought that Peter is put in the background, studying off a book held open by John, the favourite evangelist of the Reformation and of Luther, in this representation of John some have recognized the features of Melanchthon, its history and all the poet Schiller's correspondence must be obvious. These various classes of work were carried on in the face of failing health. In the cottons of the Low Countries Durer had caught a fever of which he never shook off the effects. The evidence of this we have in his own written words, as well as in the sketch which, he drew to indicate to some doctor with whom he was in correspondence the seat of his suffering, and again, in the record of his physical aspect—the shoulders already somewhat bent, the features somewhat gaunt, the old pride of the abundant locks shaved away—which is preserved in a portrait engraved on wood just after his death, from a drawing made not doubt not long previously that death came suddenly, so suddenly that there was no time to call his dearest friends to his bedside, on the night of the 6th of April 1528. Durer was buried in the vault belonging to his wife's family, but since disturbed, in the burying-ground of St John at Nuremberg He left a name that will be honoured by the latest posterity, and a place that nothing could fill in the affection of his noblest contemporaries. This is the grave and feeling Recognition of Luther, in a letter written to their common friend, Eoban Howe—"As for Durer, assuredly admiration bids us mourn for one who was the best of men, yet you may well hold him happy that he has made so good an end, and that Carst has taken him from the midst of this time of troubles, and from yet greater troubles in store, lest he, that deserved to behold nothing but the best, should be compelled to behold the worst. Therefore may lie in peace with his fathers Amen." The principal extant paintings of Durer, with the places where they are to be found, have been mentioned above. Of his drawings, by far the richest collection is in the Albertina Palace at Vienna, where a large volume, forming part of Lord Arundel's collection, is preserved. By the acquisition of the Poncy-Haller collection, from the Berlin Museum has now (1877) taken certain the third place The Louvre also possesses some good examples, and many others are dispersed in various public collections, as at Munich, Hamburg, Vienna, Basel, Milhn, and Florence, as well as in private hands all over Europe. The principal editions of Durer's theoretical writings are these—

**Geometrie und Perspective**—Unterweisung der Messung mit dem Zirkel und Komass, in Liedern, Aachen und zu Nuremberg, 1525; a Latin translation of the same, with a long title, Paris, Wechel, 1532, and another ed in 1555 Again in Latin, with the title *Institutionum geometrarum libri quatuor*, Archon, 1665

**Fortification**—Eliche Unterweisung in das Seltenheit der Schlach, Stadt, und Platten, Nuremberg, 1527; and other editions in 1530 and 1538 A Latin translation of the same, with the title Der wunders, arcbeus, artificiel de l'architettura, Paris, Wechel, 1535.

**Human Proportion**—Herein begriffen von Buclier von menschlicher Proportion, Nuremberg, 1524 Latin translation De Similitudetaturs in rea humanae corporum libri in latine converten, de variis figuration, &c, libri II, Nuremberg, 1532.

The private literary remains of Durer, his diary, letters, &c, were first published, partly in Von Murr's *Journal zur Kunstgeschichte*, Nuremberg, 1756-1757; afterwards, in Capitana's *Reise*, of A. Durer, Nuremberg, 1827; and again, carefully edited by Profess Thunen, in the *Quellenarbeiten fur Kunst- und Geschichte* in Kunst- und Kunstdruck, Vienna, 1872.


DURFY, Thomas, more generally known by the familiar name of Tom d'Urfe, an English satirist and song writer, was descended from a family of French Huguenot refugees, and was born at Exeter. The year of his birth is unknown. He was originally bred to the law, which he forsok for the more congenial employment of writing plays and songs. His humour both in writing and in singing the latter procured him access to the highest circles, and made him a favourite even at court Addison in the *Guardian* (No. 67) relates that he remembered more than once to have seen Charles II leering on Tom d'Urfe's shoulder and humming over a song with him. He was a strong Tory and Protestant, and it is said that his songs had considerable influence in strengthening the cause of his party His dramatic pieces, numbering upwards of thirty, were well received, but were so licentious that none of them kept the stage during the absolute period for which they were written. D'Urfe, by impudence and extravagance, became poor as he grew old; and having prevailed on the managers of the playhouse to act his comedy of the *Flouting Satire* for his benefit, Addison wrote the above mentioned paper in the *Guardian*, with another (No 82) giving a humorous account of his eccentricities, in order to procure him a full house. He died at an advanced age in 1725. His songs, published in 6 vols, under the title of *Pleas to Forse Melodran*, were republished in 1875.

DURHAM, COUNTY PALATINE OF, one of the northern fertile shires of England. The country is triangular in form, its eastern limit or base being a coast-line exposed to the German Ocean. It is separated from Northumberland chiefly by the Tyne, and its tributary the Derwent; and from the Tees Towards its western extremity it joins Cumberland and Westmoreland. Its greatest length is 45 miles, and its greatest breadth 36 miles, and it contains an area of 1012 square miles, or 647,692 acres. It is divided into four wards—Chester and Eagleson in the north, and Darlington and Stockton in the south. There were formerly three outlying portions of the county, shown in old maps, and known as North Durham (including Northamshire and Inlandshire), Bedlingtonshire, and Crayke. These were attached to the county as having formed parishes of the ancient "parish of St Cuthbert," of which the land between the Tyne and the Tees was the chief portion.

Physical Features—The western angle of the country is occupied by spur of the Pennine chain, and hence is mountainous, with black, naked, and barren regions, from which issue numerous streams flowing to the sea. The elevations vary from 1000 to 2196 feet. There are some beautiful and fertile valleys in the eastern and central parts, pleasantly varied with hill and dale, and alternately appropriated to corn and pasture. Extensive tracts of heather, and meadows, in the western part of the country, are waste, but rich in minerals. In the southern districts the area of cultivation..."
DURHAM

has been considerably increased within the last few years. The ancient common fields belonging to the townships are now mostly inclosed. Draining having been carried on to a great extent; there is very little marshy ground left. Near the river Tees, and in some places bordering on the other rivers, the soil is loam or a rich clay. At a farther distance from these rivers it is of an inferior quality, with patches of gravel interspersed. The hills between the sea and an imaginary line from Brotton Castle on the Tees to Alnwick on the Derwent, are covered with a dry loam, the fertility of which varies with its depth. From this line westward the summits as well as the sides of the hills are in great part moorish wastes.

At the distance of about three miles from Darlington, at Oakenhall, are cavities in the earth, called "Hell Kettles." There are similar natural pits in the neighbourhood of Ripon, and elsewhere. The diameter of the largest is not less than 114 feet, and that of the least 75. About five miles from Hartlepool is one of the most singular clusters of rocks in the north of England, called "Black Halls," formed by the force and constant action of the waves, which have separated enormous masses of the magnesian limestone, washing some entirely away, but leaving others standing, like vast towers. In some places the rock is perforated so as to form curious arches.

The only considerable river, besides those just mentioned, is the Wear, which rises in the western hills and flows past Durham to join the sea at Bishop-Wearmouth and Monk-Wearmouth, which places unite with Sunderland to form one great town. The Team, which gives its name to the Team Valley Railway, is a mere rivulet.

Trees are chiefly confined to the banks and seats of the nooks, which rise in the western hills and flows past Durham to join the sea at Bishop-Wearmouth and Monk-Wearmouth, which places unite with Sunderland to form one great town. The Team, which gives its name to the Team Valley Railway, is a mere rivulet.

Minerals.—The western hills are composed of carboniferous limestone, succeeded eastward by millstone grit, coal-measures, magnesian limestone, and new red sandstone. The southern portion of the limestone is covered with sand, resulting from disintegration of the coal-measures and often showing black beds of coal-detritus. The mountain limestone contains productive veins of lead ore, which are extensively worked, also zine ore. The beds of coal in the coal-measures are from 5 to 6 feet thick, and have long been source of enormous wealth. The mines are among the most extensive and productive in the kingdom. At Sunderland the coal trade furnishes employment for hundreds of vessels, independently of the "keels" or lighters which convey the coal from the termini of the railways and tramways to the ships. The seams now worked extend horizontally for many miles, and are from 20 to 100 fathoms beneath the surface. Under almost every seam of coal is a bed of fire-clay, full of roots of pruneful forest trees. The basaltic formation known as the "Great Whin Sill" appears in Teesdale, and is also remarkable at Cockfield. A beautiful variety of the mountain limestone, known as Prestonian marbles, has for many centuries been quarried near Stanhope for decorative purposes, in Durham Cathedral and elsewhere taking the place of Purbeck marble, while in modern houses it is used chiefly for chimney-pieces. Ironstone is extensively worked in the neighbourhood of Swallett and Wilsington. Some excellent quarries of slate for buildings have been opened in different parts of the county. The neighbourhood of Wolsingham abounds in fine millstones. The Newcastle grindstones are procured at Gateshead Fell; and firestone of high estimation, for building ovens, furnaces, and the like, is obtained in various parts of Durham, and exported in considerable quantity.

Towns.—Besides the city of Durham, the county includes seven ancient boroughs, viz., Hartlepool, Barnard Castle, Bishop Auckland, Darlington, Sunderland, Stockton, and Gateshead. The large villages of Stanhope, Wolsingham, Stanhope, and Sedgefield near Stockton are market towns. The port of Stockton-upon-Tees is well situated for commerce Hartlepool, being on a promontory, nearly encompassed by the German Ocean, which forms a capacious bay to the south of the town is advantageously placed for maritime traffic, Sunderland and South Shields are also well placed at the mouths of the Wear and Tyne.

No county in England presents a closer network of railways than Durham. The York, Newcastle, and Berwick trunk line enters the county south of Darlington, and continues due north until at Gateshead it crosses the Tyne and enters Northumberland. From this a great many smaller lines diverge to the ports and mineral fields.

Agriculture.—Improvements in agriculture have been pursued with considerable spirit and success. On some spots of gravelly soil, turnips and barley are grown in almost perpetual succession, a crop of clover being sometimes interposed. The summers are chiefly limey and the produce of the fold-yard; and though abundance of sea-weed might be collected on the coast, as it was in mediaval times, the farmers now make but little use of it. The farms are of moderate size, few of them exceeding 200 acres. The largest portion of each is arable, except towards the western extremity of the county, where the whole is pasture. The farm houses are well situated and commodious; and improvements in farming and farming machinery keep pace with the age. The cattle of Durham have long been in great repute—except towards the western extremity of the county, where the whole is pasture. The farm houses are well situated and commodious; and improvements in farming and farming machinery keep pace with the age. The cattle of Durham have long been in great repute; and firestone of high estimation, for building ovens, furnaces, and the like, is obtained in various parts of Durham, and exported in considerable quantity.

The following figures, taken from the Agricultural Returns for 1873 and 1876, show the acreage of the principal crops and the numbers of the live stock in the county in those years:

<table>
<thead>
<tr>
<th>Crop</th>
<th>Acreage 1873</th>
<th>Acreage 1876</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oats</td>
<td>29,243</td>
<td>28,359</td>
</tr>
<tr>
<td>Barley</td>
<td>18,479</td>
<td>17,486</td>
</tr>
<tr>
<td>Green Beans</td>
<td>33,616</td>
<td>35,815</td>
</tr>
<tr>
<td>Thresh.</td>
<td>22,153</td>
<td>23,151</td>
</tr>
<tr>
<td>Grass</td>
<td>40,892</td>
<td>41,028</td>
</tr>
<tr>
<td>Wheat</td>
<td>26,204</td>
<td>20,210</td>
</tr>
<tr>
<td>Turnips</td>
<td>224,714</td>
<td>202,109</td>
</tr>
<tr>
<td>Sheep</td>
<td>61,028</td>
<td>62,028</td>
</tr>
<tr>
<td>Pigs</td>
<td>16,486</td>
<td>16,484</td>
</tr>
</tbody>
</table>

According to the Owners of Land Return, Durham was divided in 1873 among 34,317 separate proprietors, of whom the large proportion of 91 cent. owned less than 1 acre—the average of England and Wales being 71 per cent. The gross rental of the land amounted to £2,589,170, or an average of £5.14.2d. per acre—as compared with £3.0s. 2d., the average of England and Wales. This unusual value per acre is to be ascribed to the presence of minerals. The proprietors possessing more than 8000 acres were as follows:—duke of Cleveland, 55,837 acres; Ecclesiastical Commissioners, 26,068 acres; Viscount Boyne, 15,310; earl of Durham, 14,664; marquis of Londonderry, 12,823; earl of Eldon, 11,848; John Bowes, 8,313; dean and chapter of Durham, 8,089.

Natural History.—Except in the moorlands of the west only a few scraps of the county have been left in their natural state; but these portions are of great interest to the student of natural history. Some excellent quadrupeds have been observed in different parts of the country. The neighbourhood of Wolsingham abounds in fine millstones. The Newcastle
of masonry, and at Billchester the most perfect hypocaust in the north of England has been found. Castles are to be referred to portions of the churches of Chester-le-Street, Whitsome, and in the centre, surrounded by a trench, and encircled by a row of stones, which has been removed and broken to repair the sacred body of St Cuthbert, where they are referred to as marking the limits of the Bishop's estate.

The county is divided for parliamentary purposes into two divisions (North and South Durham), each of which returns two members. The northern division includes 29 polling-places, and the southern 33. The population has greatly increased within the last three years. Durham was inhabited in the year 1851 by 399,597, in 1861, 508,666, and in 1871, 685,089—353,117 males and 331,972 females. The increase between 1851 and 1871 amounts to 724 per cent. The population is estimated at upwards of 850,000 in 1877.

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Durham

which in Norman times was softened to "Duressa," whence "Durham." The castle was erected by William the Conqueror in 1072, across the neck of the peninsula, so as to guard the church and monastery. In 1093 Ealdhune's church was rebuilt by Bishop Carileph, who changed the Anglo-Saxon establishment of married priests into a Benedictine abbey.

The Cathedral.—Carileph's grand Norman church still forms the main part of the cathedral buildings; but numerous additions have been made from time to time, the chief of which are—the Galilee or western chapel, of the Transitional period, the eastern transept or "Nine Altars" and the western towers (Early English), and the central tower (Perpendicular). Decorated and Perpendicular windows have, as is usual in old churches, been freely inserted. The interior presents the appearance, as Dr. Johnson remarked, of "rocky solidity and of indeterminate duration," and combines, we may add, absolutely perfect proportion in all its original parts with a harmonious magnificence of detail in its massive columns, arches, and stone groining. It has recently been thoroughly cleaned, and supplied with much painted glass and very costly modern fittings, including a new organ built on the largest scale and of fine tone. Durham Cathedral, or "The Abbey," as old-fashioned residents still call it, has long been celebrated and still maintains its reputation for its choral services, as being at least equal to any in England in point of musical execution. This glorious building has been admirably illustrated in Carter's Plates, and in Billing's "Architecture of Durham Cathedral." It is 507 feet in length, by 200 in extreme breadth, with a central tower 214 feet in height, and two smaller ones 138 feet high at the west end. The Galilee or western chapel was built by Bishop Pudsey between 1153 and 1186, and contains the supposed remains of the Venerable Bede. In the chapel of the Nine Altars are the remains of St. Cuthbert, brought to light in 1827. The cathedral library, formerly the dormitory and refectories of the abbey, contains a number of curious and interesting printed books, and MSS., and the portable altar, vestments, and other relics found in St. Cuthbert's grave.

The see of Durham was long the richest bishopric in England. The total revenue of the dean and chapter during the seven years ending 1834 amounted to £36,937 a year. On the death of the incumbent in 1836, at the recommendation of the Ecclesiastical Commissioners, the income of the bishop was fixed at £5000 per annum—the surplus revenues of the see being reserved to form a fund for augmenting the incomes of the poorer bishops.

Castle, &c.—The castle of Durham consists of a polygonal keep, now reconstructed to form a very inconvenient set of college rooms; the great hall built by Bishop Hatfield, which in some respects exceeds any hall in the older universities; the Norman hall, now cut up into rooms; the old Norman crypt chapel; Bishop Tunstall's chapel, at present in use; the Black Staircase, built by Bishop Cope; and the kitchen, the gate-house, and other offices. These are grouped round a court very irregular in plan, and not less picturesque in general effect. Durham Castle was the chief residence of the bishops of the Palatinate, but is now appropriated to the uses of the university, with the exception of the state apartments, which are partly reserved for the bishop and for Her Majesty's judges of assize. The university was opened in 1833; an account of it will be found under Universities. Besides the cathedral, Durham has seven parish churches. There are also places of worship for Roman Catholics, and for various denominations of Protestants. The grammar school attached to the cathedral was founded by Henry VIII. in 1541, and possesses eighteen "king's scholarships," of the annual value of nearly £40 each. There are also several scholarships and exhibitions tenable at the universities. The original school-room is now used by the university of Durham; the new buildings are beautifully situated to the west of the city, and are very handsome and commodious, including residences for the head and second masters, and a school infirmary. Durham possesses flourishing diocesan training colleges for schoolmasters and schoolmistresses; and about four miles to the west of the city is the great Roman Catholic College called St. Cuthbert's College, Ushaw, the present representative of the old college at Douai.

The civil corporation of Durham and Framwellgate consists of the mayor, six aldermen, and eighteen councillors, with a recorder, a chaplain, and town clerk, two elective auditors, and two elective assessors. On the passing of the Corporation Act, 5 and 6 Will. IV. c. 76, the election of the eighteen councillors was vested in the citizens occupying houses and paying poor rates. The councillors so elected have to choose the six aldermen, and the aldermen and councillors have the election of the mayor. Four charters (all, except the third, preserved in the "Hutch" at the Guild Hall) have been granted to the city by different bishops of Durham:—the first by Hugh Pudsey, confirmed by Pope Alexander III., 1175 or 1180; the second by Tobias...
Matthew, confirmed by James I; the third by Nathaniel Lord Crew, 1684 (afterwards delivered to the bishop, the corporation acting under the second charter), and the fourth by John Egerton, 1750.

Durham can scarcely be said to have any staple trade or manufacture, though it possesses one carpet factory and one large mill for the preparation of "Durham mustard." It is now a very different place, socially, from what it was when there were twelve prebendaries with much larger incomes than the canons now have, and when "The College" was a noted centre for dignity and liberal hospitality. At that time, canonical residence was kept with much more strictness than it is at present, and the prebendaries in residence entertained guests of all classes. Noblemen and gentlemen then resided in houses in Framwellgate and Elvet, now let out into tenements and serving as the squatted homes of the very poorest class. The Bailey and Old Elvet are, however, still chiefly occupied by the upper classes, and Western Hill is a new and rapidly increasing suburb. The Palace Green is an open space having the cathedral on the south side, the castle, now University College; on the north, the Exchequer Buildings, now the university library, together with Bishop Cosin's library, on the west, the museum, alms-houses, and other offices on the east. The museum contains an almost complete collection of British birds. Six out of the seven parish churches are ancient, and possess features of interest. The high banks of the river on which the cathedral and castle stand are richly wooded, and traversed in all directions by well-kept paths, which afford ever-changing views of wood, water, rocks, bridges, the cathedral, the castle, picturesque old houses, and terraced gardens.

In 1861 the municipal borough of Durham had within its area of 880 acres 2,007 inhabited houses, with a population of 14,088. In 1871, the number of inhabited houses was 2349, and the population comprised 6956 males and 7450 females, or 14,406 in all. The parliamentary borough, which with an area of 967 acres had 14,833 inhabitants in 1871, returns two members to Parliament. (J. T. F.)

DURHAM, JOHN GEORGE LAMBERT, FIRST EARL OF (1792-1840), born at Lambton Castle, Durham, on the 12th April 1792, was the eldest son of William Henry Lambton, M.P. for the city of Durham. It is noteworthy that the family to which he belonged had held the Lambton estate in uninterrupted male succession from the 12th century. Educated at Eton, he held for a short time a commission in a regiment of hussars. In 1813, soon after attaining his majority, he was returned to Parliament as the representative of the University. In 1817, he was a member of the committee of the House of Commons and at numerous public meetings, of the coercive measures proposed by the Government. His political position was strengthened by his marriage in 1816 to the eldest daughter of Earl Grey. In 1819 he championed the rights of the people by his denunciation, in the House of Commons and at numerous public meetings, of the coercive measures proposed by the Government against the Chartists. In April 1821 he proposed in the House a scheme of parliamentary reform which was pointedly rejected by the Government in 1827, and of that of Lord Goderich by which it was succeeded. When the latter fell to pieces owing to its inherent weakness in January 1829, Lambton's services were acknowledged by his elevation to the peerage as Baron Durham. On the accession of Lord Grey to power in 1830 Lord Durham obtained the office of lord privy seal. He was one of a Cabinet committee of four who were intrusted with the preparation of the Reform Bill, the others being Sir James Graham, Lord John Russell, and Lord Duncannon. It was understood at the time that his influence was exerted to make the measure as liberal as possible, and in particular that he wished to introduce the ballot as one of its provisions. In the debates on the bill in the Lords he did not take the leading part that might naturally have been expected from the only peer who had been on the Cabinet committee for its preparation. This was owing partly to his own indifferent health and partly to grief at the death of his eldest son, the Master Lambton of one of Lawrence's most admired portraits. Continued ill-health led him to resign office in March 1833, when he was raised to the dignity of Viscount Lambton and earl of Durham. In the summer of the same year, however, he was able to undertake a special embassy to the court of St Petersburg, the chief object of which was to secure lenient treatment for the insurgent Poles. In this he was unsuccessful. When the party that had carried reform began to be divided, Lord Durham was generally regarded as a likely leader of the more advanced section, and a strongly radical speech which he delivered at the celebrated Grey banquet at Edinburgh in 1834 helped to strengthen his claim to the postion. It took the form of a reply to a previous speech of Lord Brougham, whose enmity Lord Durham had provoked. In 1837 he accepted the post of ambassador at St Petersburg, which he occupied for about a year. Meanwhile a very serious insurrection had broken out in Canada, and early in 1838 the Government found it necessary to suspend the constitutional constitution and send out a new governor with special powers. Lord Durham was selected to undertake the difficult task, for which his extensive experience and his well-known advanced liberalism were supposed specially to qualify him. Some what hasty and irascible in his temperament, he unfortunately adopted measures which were beyond the powers conferred upon him by the special Act of Parliament under which he had been appointed. These measures were disapproved of by a vote of the House of Lords on the motion of Lord Brougham, who imported the bitterness of his earlier quarrel with Lord Durham into the debate, and the Government were compelled to disallow the ordinances in which they were embodied. Lord Durham was so deeply incensed at this that he took the extraordinary step of returning home without waiting for his recall, and the Government marked its disapproval of his conduct by directing that he should not receive a salutation on landing in England. He defended his plan of administration in an able and elaborate report addressed to the queen, and his policy was practically justified by being adopted by his successor. He had returned to England in shattered health, and he died at Cowes, in the Isle of Wight, on the 28th July 1840.

DURIÁN (Malay, dur, a thorn), the fruit of Durio zibethinus, a tree of the natural order Sterculiaceae, which attains a height of 70 or 80 feet, has oblong, tapering leaves, rounded at the base, and yellowish-green flowers, and bears a general resemblance to the elm. The durian is cultivated in Sumatra, Java, Celebes, and the Moluccas, and northwards as far as Mindanao in the Philippines; also in the Malay Peninsula, in Tenasserim, on the Bay of Bengal, to 14° N. lat., and in Siam to the 13th and 4th parallels. The fruit is spherical, and 6 to 8 inches in diameter, approaching the size of a large cocoa-nut, it has a hard external husk or shell, and is completely armed with strong pyramidal tubercles, meeting another at the base, and terminating in sharp thorny points; these sometimes inflict severe injuries on persons upon whom the fruit may chance to fall when ripe. On dividing the fruit at the
sutures of the carpels, where the spines arch a little, it is found to contain five oval cells, each filled with a cream-colored, almost smooth pulp, in which are imbedded from one to five seeds about the size of chestnuts. The pulp and the seeds, which latter are eaten roasted, are the edible parts of the fruit. With regard to the taste of the pulp Mr. Wallace remarks, "A rich butter-like custard, highly flavoured with almonds, gives the best idea of it, but intermixed with it are bits of flavour that call to mind cream-cheese, ouzo-sauce, brown sherry, and other incongruities, . . . . . . it is neither acid, nor sweet, nor juicy, yet one feels the want of none of these qualities, for it is perfect as it is." The fruit, especially when not fresh from the tree, has, notwithstanding, a most offensive smell, and the seeds, which latter are eaten roasted, are the best relish for cattle; and the grain, of which the yield in favourable situations is upwards of a hundredfold, is used for the same purposes as maize, rice, corn, and other cereals. Allied species are S. bicolor, much valued in India as a forage-plant, and S. esculentum, commonly called sorghum or Chinese sugar cane, which is extensively cultivated in China, North India, and Africa. The latter species is grown in America chiefly for the manufacture of molasses from its juice, and in France as a source of alcohol. The total quantity of sorghum molasses made in the United States in 1800 has been estimated at 15,050,080 gallons.

DURRA, or INDIAN MILLET, Sorghum vulgare, is a species of grass of the tribe Andropogoneae. The terms durra and curru are applied to the plant in Arabia; in India it is known as jowari (Hindustani), jowar (Bengali), chotum (Tamil), and jonna (Telugu), and in the West Indies as Negro or Guinea Corn. It is a strong grass, growing to a height of from 4 to 8 or even 16 feet; the leaves are shining, solitary, and about 2 inches broad and 2 feet in length; the panicles are conical or club-shaped, hermaphrodite; and the seeds, which are inclosed in husks, and protected by awns, are round, hard, smooth, shining, brownish-red, and somewhat larger than mustard seeds. The plant is cultivated in various parts of India and other countries of Asia, in the United States, and in the south of Europe. Its culms and leaves afford excellent fodder for cattle; and the grain, of which the yield in favourable situations is upwards of a hundredfold, is used for the same purposes as maize, rice, corn, and other cereals. Allied species are S. bicolor, much valued in India as a forage-plant, and S. esculentum, commonly called sorghum or Chinese sugar cane, which is extensively cultivated in China, North India, and Africa. The latter species is grown in America chiefly for the manufacture of molasses from its juice, and in France as a source of alcohol. The total quantity of sorghum molasses made in the United States in 1800 has been estimated at 15,050,080 gallons.

DURSEK, JOHANN LUDWIG (1761-1812), pianist and composer, was born at Czsalu, in Ebohemia, on the 9th February 1761. His father, Johann Joseph Dussek, a musician of high reputation, was organist and choir-master in the collegiate church of Czsalu, and several other members of the family were distinguished as organists. He had thus the most favourable opportunity for the development of the musical talent which he displayed almost from infancy. Under the careful instruction of his father he made such rapid progress that he appeared in public as a pianist at the age of six. A year or two later he was placed as a choir boy at the convent of Tglau, and he obtained his first instruction in counterpoint from Spenar, the choir-master. When his voice broke he entered on a course of general study, first at the Jesuits' college, and then at the university of Prague, where he took his bachelor's degree in philosophy. During his curriculum of two and a half years he had paid unremitting attention to the practice and study of his art, and had received further instruction in composition from a Benedictine monk. In 1779 he was for a short time organist in the church of St Rombaut at Mechlin. At the close of this engagement he proceeded to Holland, where he attained great distinction as a pianist, and was employed by the stadtholder as musical instructor to his family. While at the Hague he published his first works in the form of several sonatas and concertos for the piano. He had already composed at the age of thirteen a solemn mass and several small oratorios, which still exist in manuscript. In 1783 he visited Hamburg, and placed himself under the instruction of Emmanuel Bach. Though he believed himself to have derived great benefit from this, it may be questioned whether his genius was not fitter rather than stimulated by the enthusiastic veneration with which he regarded his model. From Hamburg he proceeded to Berlin, where his powers as a pianist met with their accustomed recognition. After spending two years in Lithuania in the service of Prince Radziwill, he went in 1786 to Paris, where he remained, with the exception of a short period spent at Milan, until the outbreak of the Revolution, enjoying the special patronage of Marie Antoinette and great popularity among artists. At the close of 1789 he removed to London, where three years later he married a daughter of Dominico Corri, who was...
herself a clever harpist and pianist. In London he obtained her greatest success alike as composer, performer, and teacher. Unfortunately, however, he was tempted by the large sale of his numerous compositions to open a music-publishing warehouse in partnership with Montague Corri, a relative of his wife. The result was injurious to his fame and disastrous to his fortune. Writing solely for the sake of sale, he composed many pieces that were quite unworthy of his genius, and, as he was entirely destitute of business capacity, bankruptcy was inevitable. In 1800 he was obliged to flee to Hamburg to escape the claims of his creditors. Some years later he was attached in the capacity of musician to the household of Prince Louis Ferdinand of Prussia, with whom he formed an intimate friendship. On the death of his patron in 1806 he passed into the service of Prince Yusenburg as court musician. In 1809 he went to Paris to fill a similar situation in the household of Prince Talleyrand, which he held until his death in March 1812. Dussek had an important influence on the development of pianoforte music. As a performer he was distinguished by the purity of his tone, the combined power and delicacy of his touch, and the facility of his execution. As a composer he possessed a distinct individuality of style, and, while much that he wrote had little value, his best works rank high among pianoforte classics. His sonatas known as The Invention, The Farewell, and The Harmonic Elegy, though not equally sustained throughout, contain movements that have scarcely been surpassed for solemnity and beauty of idiom. Two operas, which he composed during his residence in London, were failures.

DUSSELDORF, a town of Prussia, at the head of a government in the province of the Rhine, on the right bank of the river, 25 miles below Cologne. It is divided into four portions—the Old Town, the Karlstadt, which dates from 1787 and is called after the electoral prince Charles Theodore, the New Town, which was in process of formation from 1690 to 1716, and the Friedensstadt, laid out within recent years. New streets are rapidly stretching out in all directions, and the villages of Pempelhortex, Bilk, and Dernendorf are already almost incorporated. Within the area of the town proper there are numerous open grounds and public squares, which prevent the regularity of its plan degenerating into monotony: the market-place, with the colossal bronze statue of the electoral prince Johann Wilhelm, the parade, the Allee Straße, the King's Alley, and the King's Platz may be specially mentioned. Of the ten churches the most noticeable are—St Andrew's, formerly the Jesuit or court church, with frescoes by Hubner, Deger, and Macke; the embalmed bodies of several of the electors, St Lambert's, with a tower 180 feet high, and containing monuments in honour of Duke William IV and Voetius, and Maximilian's, with frescoes by Setzgast and others. Besides the old ducal palace, laid in ruins by the French in 1794, but restored in 1846, the secular buildings comprise the former Jesuit college, now occupied by the administrative offices, a town-house dating from 1567, a penitentary, a lunatic asylum, several hospitals and infirmaries, a theatre completed in 1856, a music hall, a gymnasmum, and a polytechnical school. The town also possesses a library of 50,000 volumes, and is the seat of a great number of commercial and intellectual associations, but to nothing is it more indebted for its celebrity than to the Academy of Painting This famous institution, originally founded by the electoral prince Charles Theodore in 1767, was reorganized by King Frederick William in 1821, and has since attained a high degree of prosperity as a centre of artistic culture. From 1822 till 1826 it was under the direction of Cornelius, a native of the town, from 1826 to 1859 under Schadow, and from 1859 to 1864 under Benda. Benda's resignation it continued in the hands of a body of curators till 1874, when Wischmann of Weimar was chosen director. The noble collection of paintings which formerly adorned the Dusseldorf gallery was removed to Munich in 1805, and has not since been restored, but there is no lack of artistic treasures in the town. The academy possesses 11,000 original drawings and sketches by the great masters, 24,000 engravings, and 248 water-colour copies of Italian originals, the municipal gallery contains valuable specimens of the local school, and the same is the case with the Schueller collection. The principal names are Cornelius, Lessing, Achenbach, Daur, Tiedemann, and Kraus. An annual exhibition is held under the auspices of the Art Union, and the members of the Artist's Society, or Malkasten, as they are called, annually celebrate festivities and masquerades of a remarkable description. Not only is Dusseldorf situated in the greatest manufacturing province of Prussia, but it is itself the seat of various important industries—cotton and carpet weaving, iron-founders, wire-drawing, sugar-refining, brewing, distillation, and the making of pianos and carriages. The surrounding country is largely devoted to market-gardening, and the Dusseldorf mustard is in special repute. A very extensive trade is carried on both by river and by rail, the port was declared free in 1839, and is consequently one of the most frequented on the Rhine. The Dusseldorf Steam-boat Company maintains regular communication with Mayence on the one hand and Rotterdam on the other. A little to the north of the town lies the village of Dusselshof, with Count de Beek-Volmanstein's establishment for homeless children in a former Trappist monastery, and in the suburban village of Pempelhortex is the Jagerhof, the residence at one time of
Prince Frederick of Prussia, and afterwards of the prince of Hohenzollern-Sigmaringen. In 1780 the number of inhabitants was about 8000; by 1831 it was over 25,000. The year 1821 gave 41,350 (of which 3566 were military); that of 1871, 69,348.

Dusseldorf, as the form of the name—the village on the Dussel—clearly unchanges, was long a place of small consideration. In 1794, when the town was captured for a time by Count Adolfo di Bavaria from his successors it obtained various privileges, and in 1838 was chosen as their residence. After it had suffered greatly in the Thirty Years’ War and in the war of 1744, the town was violently bombarded by the French, and after the peace of Lunville it was deprived of its fortifications. In 1865 it became the capital of the Rhineland county of Berg; and in 1815 it passed with the duchy into Frankfort palace.

Among its celebrities are George and Friedrich Heinrich Jacobi, Schenk, Heine, Varnhagen, Cornelius, Camphassen, and H. von Sybel.

DUTENS, LOUIS (1730–1812), a French writer of some celebrity, was born at Tours, of Protestant parents, January 15, 1730. In his youth he devoted himself to poetry; and in 1748 he composed a tragedy, entitled The Return of Ulysses to Ithaca, which failed in Paris, but was republished with great success in London. The author, however, soon became sensible of the faults of his work, and abandoned a species of composition in which he found he was not destined to excel. He soon afterwards went to England with an introduction to Pitt, which he had received from a sister of the statesman. His first residence in London was brief, but he soon returned and obtained an situation as tutor in a private family. The father of the pupil was a man of considerable literary and scientific attainments, who instructed him in those branches of science which he was destined to pursue. He soon afterwards was appointed chaplain and secretary to Lord MacKenzie, the English minister at the court of Turin, and left England in October 1758. In 1760, when Lord MacKenzie returned to England, the secretary remained at Turin as charged d’affaires, until 1762, when he returned to England and attached himself to the family of Lord Bute, who, before retiring from office in 1763, procured him a pension. He again went to Turin as charged d’affaires; and during this second mission he undertook the task of collecting and publishing a complete edition of the works of Leibnitz (Geneva, 6 vols. 1769) and wrote his celebrated Discours sur la découverte du Siècle des Lumières. On his return to England he attached himself to the duke of Northumberland, who procured him the living of Elsdon, in Northumberland. He accompanied the duke’s son, Lord Algernon Percy, in his travels through France, Italy, Germany, and Holland; and while at Paris he was chosen a member of the Academy of Inscriptions, in 1775. In the same year he was made a fellow of the Royal Society. In 1776 he returned to England, and soon afterwards accompanied Mr MacKenzie and his wife on a tour to Naples. On his return Dutens was invited by Lord Mount-stuart, who had been appointed envoy extraordinary, to accompany him to Turin, and found himself for the third time charged d’affaires at that court, during a short absence of the envoy. From Turin he went to Florence, and thence to Rome. He was in Paris in 1783, and returned to London the following year. The revenue he derived from his living amounted to £600 per annum, together with a considerable legacy left him by Mr MacKenzie, and estimated at £15,000, enabled him to pass the remainder of his life in affluence. He died at London, May 23, 1812.

The principal works of Dutens were his Recherches sur l’origine des Découvertes attribuées aux Modernes (1766, 2 vols. 8vo); Appel au bon Sens (London, 1777, 8vo), directed in defence of Christians
DUVERGIER DE HAURANNE, Jean (1581-1643),
abbe of St Cyran, a celebrated French theologian, was born
at Bayonne in 1581. He studied theology at the university
of Louvain, where he formed an intimate friendship with
Jansen, who was his fellow student. After quitting
Louvain in 1605, he went to Paris, where his intimacy
with Jansen continued, and with him he pursued with great ardour
the study of the fathers. Leaving Paris in 1611, they
continued the same studies at Bayonne, where Duvergier
received the canonry of the cathedral. When Jansen left
Bayonne, Duvergier returned again to Paris, and shortly
after his arrival there his indefatigable and asetic character
secured for him the esteem of the bishop of Potten, who
gave him a canonry, and in 1620 made him abbe of St
Cyran. He established in the monastery the order of St
Benoit in all its rigour; but his zeal for reform was so great
that it awakened opposition, and he found it expedient to
quit his diocese and return to Paris. Here he formed a
connection with the influential Arnauld family, and along
with Angélique Arnauld, director of the convent of Port
Royal, he completely reformed that institution. His rigor-
ous asceticism acquiring for him great ascendency over
female minds, his fame and influence increased with great
rapidity, and he soon began to number among his disciples
members of the highest classes of society, and to have as
his personal friends some of the chief dignitaries of church
and state. Soon, however, his enemies came to be as
numerous as his friends. His rigid and domineering dis-
position began to alienate from him many of his disciples,
and, taking a leading part in the Jansenist controversy, he
excited against himself the peculiar animosity of the Jesuits.
At last his views came to be suspected by Richelieu,
and he was arrested and thrown into prison at Vincennes, 11th
March 1638. No evidence could be obtained from his
papers sufficient to criminate him, but to limit his influence
he was retained in durance at Vincennes—where, however,
his was to keep up intercourse with his patrons and
disciples. On the death of Richelieu he regained his liberty,
and resumed his religious duties and his war with the
Jesuits with the same energy as before; but he enjoyed
only six months of freedom, dying from a stroke of apoplexy,
10th October 1645.

DWARF (Saxon dwerg, deerc, German, Zwerg), a term
applied to men, animals, and plants that fail to reach even
the mediocrity of growth natural to their respective classes.
It is also otherwise applied. In France, for instance, a
yolkless egg is termed "un cuf nam," or dwarf egg; and
an imitation of fine English cloth is called "un nom Londins,"
technically "London dwarf." The norm or rumpu of the Romans might be a dwarf
by nature or a person dwarfed by cruel art. In the former
case, his lack of height found compensation in increased
strenth, as exemplified in the line by Propertius, "Nanus et
eipse suos breviter concretus in artus," etc., in the latter,
where growth had been early suppressed by the dealers
who manufactured monstrosities for fashionable people in
Rome, weakness bred contempt. The norm, or, if he were
more than unusually diminutive, the miniunm, was exposed to
application of the proverb, "nama cum sia, cede,"
equivalent to "little people must not be in our way."  

Various have been the recipes for dwarfing children from
birth. The most effective, according to report, was anoint-
ing the back bone with the grease of moles, bats, and
dormice. It is also said that pups were dwarfed by
frequently washing their feet and backbone, the consequent
drying and hardening of those parts hindered, it was alleged,
their extension. In England, the growth of boys intended
for riders in horse-races is kept down to some extent by
the weakening process of "sweating." There is a familiar story of a partnership entered into
between a dwarf and a giant. The dwarf had the intellect,
the giant had the strength; the result of this limited
liability was that the giant received all the blows, and the
dwarf all the profits. The partnership was consequently
brokeu up. A fact of which we are reminded by this
fiction, occurred in Austria in the 17th century—To please
the caprice of an empress, all the giants and dwarfs in the
empire were brought together to Vienna, and were lodged
in one building. The dwarfs were told they had nothing
to fear from the giants, but the latter were soon seen in
bodily fear of the dwarfs, who made the life of their
stupendous companions unbearable by tearing them,
molesting them, tripping them up, and unscrupulously
robbing them. The giants, with tears as big as pears in
their eyes, prayed the authorities to relieve them from
the persecution of their tiny enemies, and the prayer was
granted. At a later period, another German princess
promoted marriages among dwarfs, but without succeeding
in the object she had in view. When Lady Mary Wortley
Montague was in Germany, in the last century, she found
that a dwarf was a necessary appendage to every noble
family. At that time English ladies kept monkeys. The
imperial dwarfs at the Viennese court were described by
Lady Mary as "as ugly as devils" and "bedaubed with
diamonds." They had succeeded the court fools, and exer-
cised some part of the more ancient office. Absolute princes
could not stoop to familiar discourse with mankind of less
degree. Therefore did they hold dwarfs to be outside
humanity, made intimate associates of them, and allowed
them an unrestrained freedom of speech, by the exercise of
which the dwarfs imparted to their masters strange and
strange truths which on the lips of ordinary men would have been
treason. One of the kings of Denmark is said to have
made a prime-minister of his dwarf, in order to get at rough
truths which a minister of ordinary stature would have
been afraid to utter. It could not have been for this reason that Stanislas, ex-
king of Poland and duke of Lorraine, was so attached to
his dwarf, Nicholas Ferry, otherwise known as "Belé,"
for this dwarf was weak in mind and body. Belé was one of
dwarf children of peasant parents in the Vosges. He
was 3 feet in height, and his fame has not died out at
Nancy and the department of the Meurthe. At his death
in 1764 he was in his twenty-third year, and, among the
five phrases of which his epitaph is composed, the world
still assured that Belé was "chien du mourel Antonin.

But Belé was not so remarkable a dwarf as Richebourg,
who died in Paris in 1558, at the age of ninety. He was
only 25 inches in height. In his childhood he was a servant
(without especial duty) in the Orleans family. In later
years, Richebourg was their pen-carrier. He is said to have
been put to use in the Revolutionarry period,—
passing in and out of Paris as an infant in a nurse's arms,
but with despatches, dangerous to carry, in the little man's
baby wrappings. At present, on the Continent, Russia
and Turkey alone have a common sympathy for dwarfs.
At the court of the sultan, should the dwarf, besides being
of efilh height, be deaf, dumb, and qualified to hold a place
among the official eunuchs, the poor creature is accounted as a priceless treasure.

The early history of British dwarfs is less saddled with wonders than the record of dwarfs of the classical times. Britain has nothing to compare with Philetas of Cos, the little tutor of Ptolemy Philadelphus. Philetas would have us believe that Philetas was so light as to be able to stand upon his head in his pockets to prevent his being blown away. Nor does any British chronicle register such minute marvels as the couple of dwarfs possessed by Julius, the niece of Augustus, namely, Coropas and Julia, little handmaid Andromeda. The height of both was 2 feet 4 inches. This, however, was little less than the stature of the Aztec dwarfs who were exhibited (and were publicly married) in London some twenty years ago. It is not that British annals or tradition can be said to be known by the now generic Dame of the Royal College of Surgeons, London.

In the year in which Boruwiaski died, 1837, the line of publicly exhibited dwarfs was continued by the birth of the existing American pigmy, Charles Stratton, better known as "General Tom Thumb." In 1844 he appeared in England, where his grace, vivacity, and good humor made him popular, from the royal family to the general public, before whom he stood on the Lyon's Theater. He also made his appearance on the stage in Paris. After extensive travel in both hemispheres, he again visited England in 1857, but the dwarf man, despite many personal and intellectual qualities, was less attractive than the dwarf boy. In the year 1863 the "General" married the very minute American lady, Lavinia Warren (born in 1842), with whom he has seen many lands, and they are now enjoying honourable retirement in their own. (u. no.)

Dwight, Timothy (1755-1817), an eminent American divine, was born at Northampton, Massachusetts, 14th May 1755. His father, though educated at Yale College, was a merchant, and his mother the third daughter of Jonathan Edwards. His mother began to instruct him almost as soon as he was able to speak, and it is said that he learned the alphabet at a single lesson, and before he was four years old was able to read the Bible. In 1765 he entered Yale College, and received his B.A. degree in 1769, shortly after which he went to take charge of a grammar school at New Haven, where he remained two years. In September 1771 he was appointed tutor in Yale College, where he distinguished himself by the skill with which he taught the higher mathematics. In the same year he began an epic poem entitled the Conquest of Canaan, which was published in 1785. He received his degree of M.A. in 1772, and afterwards pursued his studies with the view of adopting law as his profession, but, changing his intention, was licensed as a preacher of the gospel in 1777, and accepted the office of chaplain to the forces, which post he held for some time. In 1783 he was ordained minister of Greenfield in Connecticut, when he opened an academy which speedily acquired a very high reputation, and attracted scholars from all parts of the Union. He received the degree of D.D. from Princeton College in 1785, and that of L.L.D. from New Jersey in 1810. In 1799 he was elected president of Yale College, and by his judicious management restored that institution to the high place, from which it had fallen before his appointment. He died at Philadelphia on the 11th January 1817. Dr Dwight was the author of a considerable number of essays and sermons; and his Theology Explained and Defended in a series of Sermons was published in 5 vols., with a life of the author, in 1818. Two additional volumes of sermons were published in 1827, and had an extensive circulation both in the United States and in England.

DWINA, a name common to two important rivers of European Russia. (1.) The Northern Dwina, or Drina Siverskaya, belongs to the basin of the White Sea, and is formed by the junction of the Sukhona and the Yak, which, being the former in the south-east and the latter in the south-west of the government of Vologda, meet in the neighbourhood.
of Veliki Ustjug, at a height of 300 feet above the sea, in 60° 46' N. lat. and 46° 20' E. long. From its mouth, in the Gulf of Archangel, the distance to the confluence of the co tributary streams is about 400 miles, and to the source of the Sukhona 750 miles. The drainage area is estimated at from 140,000 to 145,000 square miles. Except at the rapids the current of the Dvina is comparatively slow, as the average fall per mile is only 9 inches. Till its union with the Vychegda, a river which exceeds it in volume, it flows for the most part in a single, well-defined, and permanent channel; but below that point it often breaks up into several branches, and not unfrequently alters its course. In the neighbourhood of Archangel it divides into three distinct arms, which form a regular delta, but of these that of Berezoff alone is navigable for seawater vessels, and even it is crossed by a bar at the mouth with not more than 14 1/2 or 15 1/2 feet of water at full tide. Above the confluence of the Vychegda the breadth is about 1750 feet, below that point it widens out to 3500, and near Archangel it attains to three times that measure. The river affords a valuable means of inland navigation. From Vologda to Archangel the ordinary passage requires from 10 to 12 days, and the return journey from 6 to 8 weeks. The channel is free from ice for about 174 days in the year.

II. The Southern Dwina, or Dwina Zapadnaya, in German Duemn, belongs to the Baltic sea, and takes its rise in a small lake about 800 feet above the level of the sea, in the government of Tver, not far from the sources of the Volga and the Dnepro. In its whole course of about 600 miles it waters the seven governments of Tver, Pskoff, Vitebsk, Mogilieff, Vlina, Curland, and Livonia; and it is calculated that it drains an area of about 65,000 square miles. From Dunamburg to Riga, a distance of 204 miles, there is altogether a fall of 295 feet, of which 105 are in the 463 miles from Jakobstadt to Friedrichstadt. In the lower part of its course the river attains an ordinary depth of 30 feet, and an average breadth of 1400 feet, but during the spring flood it sometimes rises 14 feet above its usual level, and extends its waters for about a mile. The inundation lasts at Riga from two to ten days. Near the mouth the river is usually free from ice 243 days in the year, and in the government of Vitebsk for 255. It is navigable from the confluence of the Mezha downwards, but the number of rapids and shallows greatly diminishes its value. No fewer than 63 of the former are counted below Jakobstadt, and among these are some of the most dangerous of all. The passage to Riga from Velich usually takes thirteen days, from Dama seven, from Dunamburg four, from Friedrichstadt one. Navigation can also be carried on by the following tributaries of the Dvina—the Torona, the Uszt, the Mecha, and Oshbes, the Kasplia, the Ulla, and the Bolderens. By Polemy and Marcian of Heraclea the river is mentioned as the Rubon or Rhodon; at a later date it is called the Khenzu or Tarunt, and till the present day has the name of Polot among the White Russians. The modern designation is said to be due to the Schlenwi and Bremen sailors, who were struck by the sandstone hills at the mouth of the river.

DYCE, ALEXANDER, (1798-1869), a distinguished dramatic editor and literary historian, was born at Edin- burgh on the 30th June 1798, and, after receiving his early education at the High School of his native city, became a student at Exeter College, Oxford, where he graduated as B.A. Having adopted the clerical profession, he officiated as curate at Lentegloss, in Cornwall, and subsequently at Nuyland, in Suffolk, and, in 1827, he settled in London. His first books were Select Translations from Quintus Smyrnius, an edition of Collis, and Specimens of British Poets. He issued annotated editions of George Peele, Robert Greene, John Webster, Thomas Middleton, and Beaumont and Fletcher, with lives of the authors and much illustrative matter. He completed an edition of Shirley left unfinished by Gifford, and contributed biographies of Shakespeare, Pope, Akenside, and Beattie to Pickering's Almane Poets. He has also edited several of Bentley's works, and Specimens of British Poets, and his carefully revised edition of John Skelton, which appeared in 1843, did much to revive interest in that trenchant satirist. In 1857 his edition of Shakespeare was published by Moxon; and the second edition, a great improvement on the old one, was issued by Chapman and Hall in 1865. Dyce's interest in Shakespeare manifested itself further in such works as Remarks on Collin's and Knight's Editions of Shakespeare, A Few Notes on Shakespeare, and Structures on Shakespeare's New Edition of Shakespeare. He was intimately connected with several literary societies, and undertook the publication of Kempe's Nine Days' Wonder for the Camden Society; and the old plays of Timon and Sir Thomas More were published by him for the Shakespeare Society. He was associated with Halliwell, Collier, and Wright as one of the founders of the Percy Society, which aims at publishing old English poetry. Dyce also issued Recollections of the Table-Talk of Samuel Rogers, which has been several times reprinted both in Britain and in the United States.

The editions of the dramatists already mentioned were re-issued with many improvements. Dyce died on the 15th May 1869. His reputation rests on his contributions to English literary biography, and on the untiring industry, abundant learning, and admirable critical acumen displayed in his editions of the old English poets. His wide reading in Elizabethan literature enabled him to explain much that was formerly obscure in Shakespeare, while his sound judgment was a sure check to anything like extravagance in emendation. His labours resulted in the best text of Shakespeare we possess. While preserving all that is valuable in former editions, Dyce has added much fresh matter. The Glossary, which consists of a large volume of 500 pages, is the most exhaustive that has appeared. Not only rare words are explained, but common words when employed with an unusual meaning, phrases, proverbs, old customs, and difficult allusions. The book is, therefore, an important contribution to philology and to the history of the English language, as well as to the elucidation of the text. The mere number of words in Dyce's Glossary shows a great advance in comprehensiveness. It is calculated that the Globe Glossary has about 2500 entries, and Staunton's 2500, while Dyce's has upwards of 5000. The meanings of the words, as used by the poet, are accurately given, and are illustrated by literary quotation and linguistic comment. Altogether Dyce's Shakespeare is likely long to remain the standard edition of our English dramatists.

DYCE, WILLIAM (1806-1864), a distinguished painter, was born in Aberdeen, where his father, a fellow of the Royal Society, was a physician of some repute. He attended Marischal College, took the degree of M.A. at sixteen years of age, and was destined for one of the learned professions. Shewing a turn for design instead, he studied in the school of the Royal Scottish Academy in Edinburgh, then as a probationer (not a full student) in the Royal Academy of London, and thence, in 1825, proceeded to Rome, where he spent nine months. He returned to Aberdeen in 1826, and painted several pictures, one of these, Bacchus nursed by the Nymphs of Nysa, was exhibited in 1827. In the autumn of that year he went back to Italy, showing from the first a strong sympathy with the earlier masters of the Florentine and sienese Schools. "Venus and Child" which he painted in Rome in 1828 was much noticed by Overbeck and other foreign artists. In 1829 Dyce settled in
DYE—DYE

Edinburgh, taking at once a good rank in his profession, and showing considerable versatility in subject-matter. Portrait-painting for some years his main occupation of his time; and he was particularly prized for likenesses of ladies and children. In February 1837 he was appointed master of the school of design of the Board of Manufactures, Edinburgh. In the same year he published a pamphlet on the management of schools of this description, which led to his transfer from Edinburgh, after eighteen months' service there, to London, as superintendent and secretary of the then recently established school of design at Somerset House. Mr J. R. Herbert was head-master about the same time. Dyce was sent by the Board of Trade to the Continent to examine the organization of foreign schools; and a report which he eventually printed, 1840, led to a remodelling of the London establishment. In 1842 he was made a member of the council and inspector of provincial schools, a post which he resigned in 1844. In this latter year, being appointed professor of fine art in King's College, London, he delivered a noticeable lecture, The Theory of the Fine Arts. In 1835 he had been elected an associate of the Royal Scottish Academy; this honour he relinquished upon settling in London, and he was then made an honorary R. A. In 1844 he became an associate, in 1848 a full member, of the London Royal Academy, he also was elected a member of the Academy of Arts in Philadelphia. He was active in the deliberations of the Royal Academy, and it is said that his tongue was the dread of the urbane President, Sir Charles Eastlake, for Dyce was keen in speech as in visage; it was on his proposal that the class of retired Academicians was established. In January 1850 Dyce married Jane, daughter of Mr James Brand, of Bedford Hill, Surrey. He died of a cancerous disease in his house at Streatham on 14th February 1864, leaving two sons and two daughters.

Such is a brief outline of the honourable and prosperous career of one of the most learned and accomplished of British painters—one of the highest in aim, and most consistently self-respecting in workmanship. His finest productions, the frescoes in the Queen's Robing-room in the Houses of Parliament, may rightly be called great, and an honour to the country and time which produced them; these frescoes, and the water-glass paintings of Maclise in the same building, would find few rivals in contemporaneous Continental labour. Generally, however, there is in Dyce's work more of earnestness, right conception, and grave, sensitive, but rather restricted powers of realization, than of authentic greatness. He has elevation, draughtsmanship, sympathy, on occasion fine colour, along with some, a certain leaning on precedent, and castigated semi-conventionalized type of form and treatment, which bespeak rather the scholarly than the originating mind in art. The following are among his principal or most interesting works (oil pictures, unless otherwise stated). 1829: The Daughters of Jethro defeated by Moses, Puck. 1830: The Golden Ages; the Infant Hercules strangling the Serpents (now in the National Gallery, Edinburgh), Christ crowned with Thorns. 1835: A Dead Christ (large lunette altarpiece). 1836: The Descent of Venus, from Ben Jonson's 'Triumph of Love'; 'The Judgment of Solomon, prize canvas in tempera for tapestry (National Gallery, Edinburgh). 1837: Francesca da Rimini (National Gallery, Edinburgh). 1838, and again 1846: The Madonna and Child. 1839: Dunstan separating Edwin and Elgiva. 1844: Josiah sitting on the Deliverance (the finest perhaps of the oil-paintings). 1850: The Mowing of Jacob and Rachel. 1851: King Lear and the Fool in the Storm. 1855: Christabel. 1857: Titian's first Essay in Colouring. 1859: The Good Shepherd. 1860: St John bringing Home his Adopted Mother, Pegwell Bay (a coast scene of remarkably minute detail, showing the painter's partial adhesion to the so-called "pre-Raphaelite" movement of that time). Dyce executed some excellent cartoons for stained glass—that for the choirmen's window, Ely Cathedral, and that for a vast window at Alnwick in memory of a duke of Northumberland; the design of Paul rejected by the Jury, now at South Kensington, belongs to the latter. In fresco-painting his first work appears to have been the Consecration of Archbishop Parker, painted in Lambeth Palace. In one of the Westminster Hall competitions for the decoration of the Houses of Parliament, he displayed two heads from this composition; and it is related that the great German fresco-painter Corot, who had come over to England to give advice, with a prospect of himself taking the chief direction of the pictorial scheme, told the Prince Consort frankly that the English ought not to be asking for him, when they had such a painter of their own as Mr Dyce. The cartoon by Dyce of the Baptism of Edithbert was approved and commissioned for the House of Lords, and is the first of the works done there, 1845, in fresco. In 1848 he began his great frescoes in the Robing-room—subjects from the legend of King Arthur, exhibiting chivalric virtue. The whole room was to have been finished in eight years; but ill-health and other vexations thralled the artist, and the series remains unfinished. The largest picture figures Hospitality, the admission of Sir Tristram into the fellowship of the Round Table. Then follow—Religion, the Vision of Sir Galahad and his Companions; Generosity, Arthur unhorsed, and spared by the Victor; Courtesy, Sir Tristram harping to La Belle Yeux; Mercy, Sir Gawain's Tournament. The fame of the Circle sacred subjects in All Saints' Church, Margaret Street, London; of Comus, in the summer-house of Buckingham Palace, and of Neptune and Britannia, at Osborne House, are also by this painter.

Dyce was an elegant scholar in more ways than one. In 1838 he obtained the Blackwell prize at Aberdeen for an essay on animal magnetism. In 1843-4 he published an edition of the Book of Common Prayer, with a dissertation on Gregorian music, and its adaptation to English words. He founded the Motett Society, for revival of ancient church-music, was a fine organist, and composed a "nouveau poème" which has appropriately been sung at Royal Academy banquets. His last considerable writing relating to his own art was published in 1853, The National Gallery: its Formation and Management. (w. m. e.)

DYEING is the art of colouring in a permanent manner porous or absorbent substances by impregnating them with colouring bodies. Most vegetable and animal bodies are porous or absorbent, and can be dyed; some minerals also, such as marble, can absorb liquid colouring matters; but the term dyeing is usually confined to the colouring of textile fibrous materials by penetration. The superficial application of pigments to tissues by means of adhesive vehicles, such as oil or albumen, as in painting or in some kinds of calco-printing, is not considered as a case of dyeing, because the colouring bodies so applied do not penetrate the fibre, and are not intimately incorporated with it. The mere saturation of textile fibre with a solution of some coloured body and subsequent drying do not constitute a case of dyeing, unless the colour becomes in so far permanently attached to the fibre that it cannot be washed out again by the solvent employed or by common water.

In the present article dyeing will be considered only with relation to the vegetable and animal fibrous substances which are commonly used in clothing or furnishing—the less important arts of dyeing feathers, skins, ivory, wood, marble, &c., being left over for treatment under other headings.
DYING

HISTORICAL SKETCH.

That dyeing was practised in the most ancient times is abundantly proved by the frequent mention of dyed colours in the oldest extant writings, that it was not a common art seems apparent from the use to which coloured garments were devoted, and the distinction which they conferred upon the wearers. It is probable that such definite and bright colours as the "blue, and purple, and scarlet" mentioned several times in the book of Exodus, as well as the Tyrian purple so often referred to by Roman writers of the Augustan age, were so costly as not to be available for general and common use. Pliny is the only one of the older writers from whom we might have expected an account of the processes of dyeing employed at his time; but, except a reference to two or three tintorial substances, and a description of a process of obtaining several colours by one dyeing operation, which he saw practised in Egypt (see Calico-printing, vol. iv. p. 684), there is nothing detailed in his writings:—he in fact formally excuses himself from entering upon the subject as one not worthy of his attention.

The Tyrian purple is the only dye treated of at some length in Pliny and contemporary authors; its discovery and employment gave wealth and prosperity to Tyre and Sidon more than 1000 years B.C. In the days of the Roman conquests in the East it was reserved under penal statutes for imperial use, its production then declined, and eventually both the material and the art of using it were lost. From Pliny's description, modern investigators were enabled to rediscover the shell-fish which yielded the dye, but the colours furnished by it were neither so bright nor so permanent as those obtainable from much less costly dyeing materials; and there is reason to conclude that the most brilliantly tinted garments of an Egyptian priest of Isis or Osiris, or the mantle of a Roman emperor, were poor and dull in hue compared with those within reach of a domestic servant of the present time.

From many independent sources—Homer, Strabo, Herodotus, &c,—it is clearly shown that the manufacture of coloured tissues was carried on by the Oriental nations. A knowledge of the art spread slowly westward, but there are few records of its existence to be found from the time of Pliny to about the 15th century. It would appear that the Jews held the secret or the monopoly of the dyeing art during this long period. According to Mrs Merrifield, Benjamin of Tudela relates that when he visited Jerusalem between 1160 and 1173 he found only 200 Jews resident in that city, and these were engaged in wool-dyeing, which trade was entirely in their hand. Beckmann shows that at the same epoch the art of dyeing in Italy was principally carried on by the Jews. It is in Sicily that we can first distinctly discern the practice of dyeing in Europe; afterwards the Italians generally practised it; and in the 15th century dyers formed important guilds in Florence, Venice, and other cities. It is not to be supposed that the art of dyeing was ever completely lost, the records of particular seats of the art only indicate that at such places some special excellence had been acquired which gave them a further reputation than was enjoyed by others. The domestic records of all modern nations speak of dyers and dyed cloths. Among the ancient laws of Ireland are some which lay down the number of colours that may be employed in the dress of various classes of society, the monarch alone being permitted to wear seven colours; from which it may be inferred that if the Irish at a very early period were not dyers, they at least had variously dyed garments. Similar facts can be adduced of all countries that possess an early literature.

From the perishable nature of textile substances and their comparatively small intrinsic value, very few ancient examples of the dyer's art have been preserved. We have, however, one account of a cloth containing dyed yarn which may have been in the dyer's hands in Egypt 1000 years before the Christian era, and we have still in good preservation ecclesiastical vestments containing dyed silks which are certainly 600 to 700 years old. The late Mr Thomson of Clitheroe examined numerous manuscripts of which some of which had a border of blue and fawn-colour made by coloured threads introduced into the loom. The blue, upon examination, was proved to have been dyed with indigo; other specimens of mummy cloth of a reddish colour appeared to have been dyed with safflower, though this colouring matter could not be recognised with the same certainty as indigo. Dr Rock, in his catalogue of the textile fabrics in the South Kensington Museum, attributes many of the church vestments there preserved to the 12th and 13th centuries, and in these can be seen silks of all the colours known to dyers up to the middle of the present century, which, though in most cases changed and faded, still present sufficient evidence that dyeing, upon this material at least, was successfully practised in the Middle Ages. It is interesting further to note that in inventories of vestments of the 13th century the silks in the dyers' stores are often designated by their colours, as in a chasuble at St Paul's, London, 1295, which is set down as "purpureo alburnum sacramentum," of a purple inclining to blood red. This, as Dr Rock says, is intelligible, but other definitions are not, as "famous Taroci colors," a Tarucco-coloured cloth, it can only be conjectured that it was a purple dyed at Tuscan, and something like the Tyrian purple, sky-blue silk is named "indicus," probably because it was dyed with indigo.

The earliest account of the processes and materials used by dyers is to be found in a collection of manuscripts in the French National Library, No. 6741, known as the manuscripts of Jehan le Béguin. These mostly refer to the art of painting and the making of artists' colours and the modes of applying them, but some describe the preparation and use of dyes. The most interesting of these manuscripts is that by Jehan Alcherus (Le Béguin was only the copier or compiler), which from internal evidence cannot be dated later than the year 1410, and some parts of which refer to a period at least thirty years earlier. Among the colouring matters and mordants there mentioned we find iron (the dust or mud from grindstones on which knives are ground) dissolved in vinegar and mixed with alum, green copperas, and gall nuts presciibed as a black colour, and methods are given for the use of Brazil woods, madder, indigo, in conjunction with lime and honey, verdigris, alkalies, oxide of tin, kermes, &c., much in the same way as those employed four centuries later by dyers and calico-printers. There are also eleven receipts for preparing colours, for painting on cloth to imitate tapestry,—examples of which (tailes pentez) of the 15th century were exhibited in Paris in 1876. Curiously enough, a certain Fleming named Theodore in 1410 brought these receipts to Alcherus from London, where they were in regular use. They are all chemical dyes, and seem to be the prototypes of the same class of colours employed long subsequently by calico-printers in England and other countries.

The first printed account of dyeing processes was an Italian work. It is referred to under the title Marmorinis dell' arte des Tinctor, published at Venice in 1425. The printer has never seen a copy of this work, nor does it appear that any exists in the chief libraries of Europe; an enlarged edition was published in 1510. In 1548 Rosetti wrote an account of dyeing, which was also published at Venice. Copies of this are not very scarce; it is the only one of these early works which is actually known. The so-called Bolognese manuscript translated in Merrifield's
Ancient Practice of Painting, is preserved in the convent of St. Salvatore at Bologna, and is said not to be of later date than the middle of the 15th century—that is, about 100 years anterior to the date of Rosetti’s work. In this manuscript, in addition to the materials enumerated by Alchemists, mention is made of wood and methods of making indigo from it; of indigo imported from India, called bayodon and beograd, of sumac, gal nuts, and lac; of the berries of buckthorn, similar to the Avignon or Persian berries, to be used for yellow; and of Brazil wood or seruano, sandal wood, and madder for red, and archil for purple. The use of nitric acid to give a yellow colour to silk, and of alum for preparing and mordanting that material, and the subsequent dying of it by Brazil wood, are also clearly pointed out. The receipt No. 362 of this manuscript is of interest as showing that the Italian dyers early possessed the method of dissolving indigo by means of the action of honey and quicklime upon it, and used the solution for the blue required in dyeing silk green.

It is very clear, then, from these accounts, and from numerous existing samples of coloured stuffs, that dyeing was well understood in Europe in the 15th century, and that the materials at the command of the dyer were sufficiently numerous and varied to enable him to produce all desired shades of colour. The improvements which took place in the dyeing art from this time until the commencement of the present era of artificial colouring matters were no doubt important in detail, but not very striking in principle.

The discovery of America was soon followed by the introduction of cochineal (see vol. vi. p. 97), but this did not enable the dyer to produce any new colours, since it differed from the ancient kermes, frequently called granum or grains, only in being ten or twelve times as rich in colouring matter. Logwood or Campeachy was also an introduction from the New World, and greatly enlarged the power of the dyer, though, from the looseness of the colour it yielded, it brought his art into some disrepute; it was in many respects a new colouring matter, but eventually settled down as the principal ingredient in the common black dye. In mordants, the discovery in Holland in the 17th century of the use of solutions of tin in acid, especially for the scarlet dye with rhododendron, was one of the greatest utility. The gradual introduction of the acetates of aluminium and iron to replace the respective sulphates was of more importance to calico-printing than dyeing proper. At the close of the last century Dr Bancroft discovered and introduced quercitron back from America for dyeing yellows, and this, from its superior richness and less cost, displaced other materials used for that purpose. Of the natural dyes introduced in the present century probably the most important is catechu. The discovery of the use of bichromate of potash as a mordant for woolen goods belongs to the latter half of this century, and has been of the highest benefit to the dyer. We shall not speak in detail of a number of dye-stuffs used by dyers of the present day, which were probably unknown to their predecessors, because most of them are only varieties of what have been long employed. Such, for example, are valonia, divi-divi, and myrobalans, which have no properties different from gums or sumach, and the different red woods, which are merely varieties of the anciently known Brazil woods.

Artificial Colouring Matters.—In the year 1858 commenced the discovery and application of a series of artificial colouring matters, which have created a distinct era in the history of dyeing. Up to that date the colouring matters used in dyeing were either the spontaneous productions of nature or simple preparations of the same. An exception, however, must be made to this statement in respect of Prussian blue and the so-called sulphate of indigo, which have been largely used as colours in dyeing since the middle of the last century, and are as truly products of art as any of the modern creations of chemistry. The purple of murexelte had only a brief existence as a dye. Mr Perkin was the first to practically produce a dyeing material from aniline, the well-known murex or purple shade so much in vogue for several years; a history of which see vol. ii. p. 100 of the present work. Other discoveries rapidly followed, and in the course of a few years it may be said that a hundred patents were taken out for methods of making artificial colouring matters from aniline and its homologues; these alkaloid bases, under the transforming hands of chemists, supplied the dyer with every shade and hue which could be desired. Up to 1869 the artificial colours were of one general family, and had many characters in common; they were very brilliant, very easily applied on fibre of animal origin (silk and wool), required no mordant, and for the most part were very loose and unstable. Imitating more or less closely the colours obtained on tissues from natural colouring matters, they had no similarity of chemical composition, and were in every other respect fundamentally different from them. In 1868 two German chemists, Graebe and Liebermann, by means of a severe synthetic investigation, succeeded in transforming anthracene into alizarin, the latter being identical in chemical composition as well as tintorial properties with the colouring matter of madder, one of the most anciently known and most valuable of all natural dye-stuffs (see vol. i. p. 577). This was the first instance in which chemistry had produced one of the old and well-known colours of the dyer; in a short time after its discovery it was made practically available for the trade, and has at this date (1877) almost entirely driven from the market the native product,—accomplishing a revolution which has no parallel in the history of colouring matters, and which is one of the most signal triumphs of modern chemistry. Other natural colouring matters have since then been put by artists such as indigo and archil, but from some difficulties in their manufacture they have not yet become commercially available.

Mechanical Improvements.—In the art of dyeing, steam power has proved no less serviceable than in other important industries. Its applications are not for-
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...lakes can be applied, but that as is only in conjunction with acid salts and at a high temperature, by means of which a sort of solution is obtained while in contact with the fibre itself. The art of the dyer consists in so arranging these three elements — fibre, metallic salts, and colouring matter — that he may obtain the formation of the insoluble colouredlake in the body of the fibre itself, whereby either by the lake being mechanically retained or chemically combined the fibre is permanently coloured.

Application of Mordants — There are three principal ways in which the mordant and colouring matter can be brought into contact with the fibre, the developments and modifications of which constitute the whole art of dyeing.

1. By the first method, which is by far the most common, the fibrous matter is separately impregnated with the mordant, which is by various means decomposed, so as to deposit its base in an insoluble state upon or within the fibre, and afterwards the colouring matter is applied. Take, for example, the case of dyeing a common black from logwood upon calico, which has an affinity for the colouring matter of the logwood dye. To prepare the calico through a hot aqueous solution of sulphate of iron, sometimes mixed with acetate of iron, and to remove the excess by passing the cloth through cold water, is to pass it not, as is usually done, through a mixture of lime and water which has the effect of decomposing the iron salts and liberating oxide of iron; but in washing in water to remove the excess of lime or of any other attached oxide of iron the calico is washed into contact with the logwood. The calico, which has now a buff colour, owing to the attached mordant of oxide of iron, when placed in a hot decoction of logwood speedily acquires a dark hue and in about half an hour has become dyed of a dense black colour, and, when thoroughly washed and finally finished, forms the common black calico of the shops. A variety of other cases might be adduced, woollen cloth boiled for some time in a bath of potash solution acquires a certain amount of a salt of chromium, which enables it to take a black colour from logwood, and other colours from other dyestuffs. Woolen, boiled with salts of tin, is enabled to dye up a brilliant scarlet in decoction of cochineal; boiled with alum, it will take a great variety of colours in various dye stuffs. The practice of calico-printing illustrates in a very forcible manner the action of mordants, by the aid of apparatus described in the article upon that subject, portions of a piece of calico are impregnated with mordants, and these portions alone acquire colour from the dyeing solution, and these designs or patterns are produced upon a white ground. The most usual method of impregnating the fibrous matter with mordant, consists in boiling it with the required metallic salts, and it will be seen hereafter that easily decomposed salts are those generally used, or substances such as chalk, alkali, or tannin are added, such as alum, to induce the formation of comparatively unstable compounds, which, under the influence of a high temperature and contact with fibrous matter undergo decomposition, — the metallic oxide or some base insoluble compound of it becoming intimately combined with the fibre, which is then said to be mordanted.

2. A second method, less general than that above described, is to apply the colouring matter before the mordant. It is resorted to only with heavy goods which absorb a large quantity of liquid, or with light colours upon other fibres, dyes produced in this way are superficial in their character, and not so permanent as those produced by the first method. In dyeing by that method it is in many cases customary to add a small quantity of mordant to the dye-bath through which the process is quite or nearly finished, or to pass the dyed goods, as a final operation, through a diluted mordant.

3. A third method is to apply the mordant and the colouring matter together to the fibrous substance. In common piece-dyeing in weak liquids this plan is seldom followed, on account of the tendency to form insoluble lakes in the solution, which, depositing only on the external part of the fibres, give inferior results, alike as to stability of colour, depth of shade, and evenness of the dyeing. The process consists in passing a calico-printing or in padding, the method is of extended application and the inconveniences experienced in common dyeing are not perceptible, owing to the greater concentration of the colouring matters and the use of thickening matter. Lakes are very probably formed to some extent during the preparation of the mordant, but, the combination taking place in the presence of a fixed medium, such as starch or gum, the insoluble lake is in an extremely fine state of division, in such a mixture there is always present an acid or carbonate of acid, such as acetic acid or carbonate of ammonia, or chloric acid of lime, cream of tartar, or benzoate of potash. These three, in the first instance, to restrain the formation of a lake, and afterwards, when the fibre and the mordant and colouring matter are submitted to heat, as in the process of steaming or stoving, facilitate the solution of any lakes formed, which thus find entrance into the fibrous matter, and there undergo combination with it,
owing to decomposition of the mordanting salts, a true dyeing taking place.

**PRACTICAL DYEING PROCESSES.**

By the foregoing preliminary observations the reader will have been prepared to comprehend the rationale of the practical processes of dyeing. In order to give a fairly comprehensive account of these, it has been found convenient to take the colours in the old arrangement of simple and compound colours. Red, blue, and yellow are supposed to be simple or primitive colours; the methods of obtaining these being given, then follow the colours from mixtures of two of the elementary colours, as green from yellow and blue, orange from red and yellow, and purple from red and blue. The colours not included in the above, and in the dyer's philosophy made by mixing the three elementary colours, red, blue, and yellow, in different proportions—namely, the browns, greys, and chocolates, and black—will be conveniently treated of after those supposed to result from the mixture of two of the primary colours.

This arrangement, though perfectly arbitrary, is both convenient and consistent as far as regards dyeing; for though modern discoveries in optics may show that pure blue and yellow do not make green, and may in other respects disturb the older ideas concerning primitive and secondary colours, yet the dyer has sufficient justification for retaining the old system, because he can show that his blue and yellow always make green, and that the proper mixture of the so-called simple colours produces a compound shade which can be calculated beforehand from the proportion of the respective colours employed.

**Red Colours.**

The most important of the red colours produced by dyeing are obtained from cochineal and from madder, the former being used for woollen and the latter for cotton goods. They are both old colours, and have arrived at their present excellence by slow degrees; they are deep and brilliant, and, as far as regards permanency, hold the highest position among all dyed colours. The processes employed are inductive as illustrating the diversity of treatment required by different fibres and colouring matters.

Red upon wool from cochineal.—Let it be assumed that the shade of red required is fine scarlet, such as is worn by officers of the British army, and that the woolen cloth is of finest quality. The cloth first requires purifying from all the extraneous substances which it has acquired in the process of manufacture, in order to prevent irregularity and unevenness in the shade of colour; this is done by methods described in the article BLEACHING. The only materials required to produce a fast scarlet upon wool are oxides of tin and the colouring matter of cochineal, but it requires much practical skill to bring them into contact properly. After the cloth is cleaned, and while it is still wet from its last washing, it is mordanted by boiling it in a solution of a salt of tin with or without cream of tartar. The parts of the colours not in actual contact with the fire are frequently constructed of pure black tin, or at least all parts out of water should be of this metal, or else protected by wood. The dyeing vessel should be made entirely of wood and heated by steam pipes; for if the cloth containing the acid solution of tin comes in contact with a copper or brass surface it acquires a stain which afterwards dyes up an unproportionable colour. What takes place in the course of boiling is that eventually a certain portion of tin, probably in the state of stannic oxide, becomes fixed upon or within the fibres of the wool, and thus a perfectly uniform manner. The tin not in intimate combination with the wool, or held merely by capillary attraction, is washed off by water before the cloth is brought into contact with the colouring matter.

The mordanted cloth is now brought into a boiler containing finely ground cochineal diffused through a sufficient quantity of water, and such is the usual manner of adding the dye and tartar; the cloth is turned continually to prevent folds or creases from interfering with the free access of the dye to all parts of it. The boiler is heated in the boiling point, and in half an hour or so the liquid becomes nearly colourless, and the cloth is found dyed of a bright red.

**THE TARTAR OF THE DYEING BOILER.**

The above may suffice to furnish a general view of the procedure usually followed, and to illustrate the principles involved with regard to numerous other dyes here the general reader a further insight into some of the operations practised in the use of that colour (and the description applies more or less to other dyes, the following particulars may be noted).

The tin mordant used for scarlet on wool.—It is now 200 years since the discovery was made of the use of tin with cochineal for dyeing scarlet; it might be thought that by this time the exact kind and quantity of tin solution to be used would have been settled; there exists, however, the greatest diversity upon this point among the practical dyers. The two salts of tin used in commerce, designated by chemists stannous and stannic chlorides, have received various names from dyers. Crystallized stannous chloride is generally known as "tin red," and the solution of the same as "murett of tin. A simple murett and a double murett of tin are also distinguished, the difference being in the degree of concentration; and in some dyers' philosophy, the murett of tin is said to be the same given to a solution of stannic chloride, elsewhere called "blackst" of tin, and a good deal of confusion is sometimes caused by the terms. The dyer, however, is in a position to judge for himself whether the shade which can be calculated beforehand from the so-called "tin red" and "blackst" of tin, and a good deal of confusion is sometimes caused by the terms. The dyer, however, is in a position to judge for himself whether the shade which can be calculated beforehand from the presence of these names from dyers. Crystallized stannous chloride is generally known as "tin red," and the solution of the same as "murett of tin. A simple murett and a double murett of tin are also distinguished, the difference being in the degree of concentration; and in some dyers' philosophy, the murett of tin is said to be the same given to a solution of stannic chloride, elsewhere called "blackst" of tin, and a good deal of confusion is sometimes caused by the terms. The dyer, however, is in a position to judge for himself whether the shade which can be calculated beforehand from the presence of these
as follows—20 lb. of tin solution, containing about 20 ounces of metallic tin dissolved in nitric acid, with the addition of a little common salt, are used to 100 lb. of the wool. The already mordanted wool, 13 lb. are taken and mixed with a solution in water of 8 lb. of crude tartar, and about 8 ounces of cochmeal are added to enable the wool to take a deep shade by reason of the progressive action of the mordant on the tin. The ingredients having been boiled for a couple of hours, the cloth is raised in clean water and placed in another boiler, containing the remaining 7 lb. of tartar and 6 lb. around cochmeal, which is sufficient to dye up a full scarlet colour, but if the scarlet is required to be very bright, or what is called "fery" coloured, a further quantity of tartar is added, this has the effect of "blowing" the depth of colour, and at the same time giving it a yellowish or orange hue, which for certain purposes is much desired.

Use of yellow scarlet—It appears that Florence, who wrote about the end of the last century, was the first to suggest that the bright fiery scarlet, which the dyes found they could best obtain by using a large quantity of tartar might be produced more cheaply by adding some yellow colouring matter to the cochmeal, or by first dyeing the cloth a yellow light yellow, he treated the yellow from quercetin bark, and succeeded as far as perhaps was possible with that material. At any rate from his time it has been customary for dyers to use the highest degree of excellence in the scarlet colour to use a purified preparation of quercetin bark, commercially known as flavine, in conjunction with cochmeal, other yellow colouring matters, such as fuste and turmeric, are also used. An admixture of these substances cheapens the cost of the colour, which can be made nearly equal in appearance to that obtained with the original "fery" red, and which is sold in its stand as scarlet, and is more readily stained by various influences. The best scarlets are still dyed exclusively with cochmeal.

Orange red on wool—This colour is also dyed with cochmeal, but with a mordant of alum instead of tartar. It is a far more certain colour than the scarlet, and compared with it is dull and flat, it is, however, rich and durable, and combines excellently with other colours.

The mordanting of cloth by means of alum, an operation of capital importance for a large series of colours derived from all varieties of dye-stuffs, must now be noticed.

Mordanting of wool—The method of mordanting with alum, generally adopted for one or two simple processes, but the chemical principles involved have given rise to much debate amongst experimenters. The alum is usually performed by boiling wool for one or two hours with a solution of common alum mixed with tartar; a certain portion of alum, or, it may be, of some compound of alumnum, becomes thus intimately combined with the wool, and forms a basis upon which a coloured lake may be produced with solutions of colouring matters. The chemical conditions are somewhat different here from those which obtain in the ease of mordanting with tin; for the disposition of tin salts in dilute solutions to decompose even spontaneously is so manifest that it may really be supposed that some action on the part of the wool takes place which induces the formation of a compound of tin. The great apparent stability of alum caused the explanation of its action given by Thennard and Roard to be for a long time accepted.

Some of the colours of mordanting solved, the brownish reds which returned it by some undefined power, so that it could not be removed by cold water, and required to be heated twenty times in an alkali solution, must now be noticed.

Artificial alizarin on wool—By employing artificial alizarin, somewhat better shades of colour can be obtained, and even pink or rose colour upon wool. A process for obtaining a fast red on woolen yarn, from alizarin, is as follows—boil 10 lb. of wool for an hour and a half with 1 lb. of common alum; boil 1 lb. of tartar; rinse in water, and then dye with 6 to 7 ounces of the tin solution being taken for 10 lb. of cloth, after boiling, the cloth is rinsed in water to remove uncombined mordant, and then dyed with madder, or preferably its derivative garum, with addition of a portion of tartar; the dyeing may be accomplished in an hour, the depth of colour varying with the amount of colouring matter used.

The shade of red between scarlet and crimson rods proper, or cherry reds, are also dyed with aluminium and cochmeal, and the same way as the scarlet, but in order to avoid a yellowish tone, the natural cochmeal may be mixed with the manufactured or modified material known as artificial cochmeal.

Ammonical cochmeal—This is made by treating ground cochmeal with concentrated aqueous ammonia for several days, the colouring matter undergoing a chemical change, and changing with the colourant, the fine ammmonial cochmeal, or alminum ammonic, is produced. The wool is then ammmonialised, and according to the proportion in which it is added to ordinary cochmeal, the natural scarlet shade is gradually brought over to the red and even to the scarlet.
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on only, for the colour fades rapidly in sunlight, and is easily washed out by soap and water. Substances similar to cowpea, which have even still more recently appeared in trade, are called cocoon and acacine, they yield beautiful but perishable red colours on wool and silk.

Red colours on cotton.—Turkey red.—Cochineal, which is so suitable a colouring matter for woollen and worsted fabrics but from very remote times the Hindus have possessed a process for dyeing a brilliant and extremely permanent red upon cotton fabrics by means of madder. This process travelled westward through the Levant into Turkey and Greece, the date of its introduction into Western Europe going no further back than the middle of the 18th century, at which period Greek dyers were induced to settle in France and make known the methods in use for the production of this much desired colour. The name Turkey red, or Adana red, was applied to cotton dyed with it at the time that such goods could be obtained only from the East, and it still retains the name. So much was the colour esteemed that in 1765 the British Government paid a sum of money to a Frenchman named Angermair in order to obtain a sample describ-}

ing the best known methods of dyeing it on yarn, and some years afterwards, the British Government paid a sum of money to a Frenchman named Bautain, to procure cotton same methods.

The dyeing of Turkey red upon cloth and yarn is now extensively carried on in Great Britain, and with great success. Turkey red, essentially a madder red with an aluminous bloom, though it differs from a common madder red by containing oil, and it is the fixing and combining of the oil with the fibre and the colour which produces its peculiarity. Divested of details the process of producing Turkey red may be divided into four stages:—(1) the oiling of the cloth, (2) mordanting with a salt of aluminium; (3) dying with madder; or its equivalents garamun or alunna; and (4) the brightening of the dyed colour. The preparation of the cloth with oil is a process used in no other kind of dyeing of; of its utility there can be no doubt, but the attempt to explain the rationale of its action has failed. There are many modifications of the method of applying the oil, but the older and more commonly used process is to mix the oil with a dilute solution of potash or soda ash, so as to diffuse it uniformly through the liquid, forming an emulsion; the oil is not dissolved by the alkalies, nor is it a solvent for them, but it is held by the state of excessively fine mechanical division. A low quality of oil or olive oil is usually employed in Europe, that from Mogador, in the coast of Africa, being very suitable. Certain kinds of oil do not answer for Turkey red, only those being suitable which, probably from containing free fatty acids or albuminous matters, readily form a milky emulsion with weak alkaline solutions, other kinds are, in use in some places. The cloth to be dyed is steeped in the oil emulsion, wrung out, and dried in a warm stove; this process is repeated six or eight times, and the cloth is finally washed in weak alkali to remove from it all the oil not intimately united to the fibre. The result of this treatment, which is the most delicate and important in the Turkey red process, is that the cloth becomes impregnated with a fatty matter, which by contact of alkalies and heated air has undergone some change from its original state, which is usually called an oxidant, but the nature of which is really unknown. The oily matter now possesses a power of attraction for mordants and colouring matters greatly superior to untreated cloth, and further, its physical condition is changed so that colour upon it is more transparent and more vivid than upon ordinary cotton.

The cloth in this state is ready for mordanting, which is done by passing it through a bath of alum, partly neutralized with carbonates of soda or by chalk, or in a bath of acetate of alumina, the object being to obtain a regular deposition of the albuminous base upon the fibre; the excess of mordant is carefully washed away from the cloth, which is now ready for dyehng.

The dyehng is accomplished in the ordinary way, by keeping the cloth in continuous motion in a vessel containing heated water, the dye staff, which may be madder, garamun, or artificial alunna. It is a very general practice to add a quantity of ox-blood to the water used in mordanting the cloth, and to introduce a mixture of salt of tin with the soap used as the last process of brightening—occasionally under a pressure greater than that of the atmospheric pressure or in order to obtain a temperature some degrees higher than 212° F.

In many processes of Turkey red dyeing, the cloth is treated with a pickle, or with a dilute solution of mordant with oil and before the mordanting; this enables it more easily to absorb and fix the allumnos mordant, but it is not essential, and is most generally omitted.

No allusion has been made to a number of extraordinary and other animal matters, which the dyer may be induced to use in the dyeing process, such as sheep-dung, cow-dung, oz-bile, &c., they can be dispensed with, and were employed probably from caprice and ignorance.

Barkwood red.—An imitation of Turkey red is obtained from barkwood; it is much inferior both in beauty and stability to the real colour, but the ease with which it can be dyed, and the costly nature of the materials employed, enable it to be sold at a much lower price, and for some purposes it is largely used. Barkwood is one of the red dyes of which the colouring matter is very slightly soluble in water; it is used in a state of fine powder. The cotton to be dyed is impregnated with a tiff mordant by any of the means known to dyers, and then boiled with the dye-stuff, the colouring matter as it dissolves is fixed by the mordant, and the process is continued until the required shade is obtained. This wood, and a similar material called canwood, are also employed in woolen dyeing to give brownsish red, and to dye a "bottom" or foundation for indigo blue colours, by which some economy in indigo is effected, and a peculiar bloom on the blue is produced.

The class of woods represented by Brazil wood, do not yield good reds upon cotton.

Blue Colours.

The most important of the blue colouring matters is indigo. This may be said indeed to be the most important of all colouring matters, both as regards the large quantity and monetary value of what is produced and sold, and the permanence and solidity of the dyed colours which it yields. The indigo dye is a manufactured article, prepared in the place of growth of the plant which produces it. The indigo plant could itself be used for dyeing, but from 300 to 250 lb. of it would be required to produce the effect of a single pound of the prepared indigo. In England, and many other countries possessing a temperate climate, the species indigofera, from which it has been cultivated, and has been used from time immemorial for dyeing blue. Its comparative poverty in colouring matter has caused it long since to be disused by dyers as a source of colour; it is, however, employed by them in the preparation of their indigo vats, but rather as a convenient material to induce fermentation than as a dye.

Indigo is distinguished from nearly all other colouring matters by its complete insolubility per se in water and other ordinary solvents. It dissolves to a very slight extent in heated aniline, petroleum, and acetic acid, upon which cooling redeposits it; the only real solvent for it is anhydrous acetic acid mixed with a little sulphuric acid, from which water precipitates it unchanged, but this solvent is inapplicable in dyeing. But solubility is an essential condition for dyeing, and means have been found to obtain satisfactory solutions of indigo by circuitous methods which involve the temporary destruction of its blue colour and a change in its chemical composition. By various decolorizing agents, indigo blue can be changed into a white substance, indigo white, which dissolves with facility in all alkaline liquids, forming a colourless or slightly yellow solution. On exposure to the air or other sources of oxygen, the solution yields the insoluble blue indigo, and permanently dyes any fibre which has been saturated with it.

This is the only case in which such a method of dyeing is applicable, and on that account it possesses much interest. We shall now proceed to describe some of the practical methods in use for indigo dyeing.

Fermentation process.—The oldest of these, and one naturally suggested by the method employed in preparing the dye-stuff, is the process of fermentation in contact with lime, or sometimes soda or potash. During this process, gaseous or liquid substances are formed, which have the power of reducing indigo from the blue to the white state, and fitting it for dyeing. This ancient method has not been superseded in England at least, being employed at the present day for dyeing the indigo blue, and dyes to the colouring matter of which is greater for woollen than for all other kinds of cloth.
The wood vat.—To a course of lectures upon dyeing, recently delivered by Mr. Jarman before the Society of Arts, we are indebted for the following account of the use of the wood vat by the Yorkshire dyers. The materials employed are indigo, wood, madder, bran, and lime. For the first, the sheets of the lignum indigo are employed, in which case the indigo must be reduced to the finest possible powder. It is generally ground mixed with water, in closed revolving cast-iron cylinders containing iron-cored balls, for several days, or until the alime or pulp formed contains no visible particles of the dye-stuff. The proportions of materials employed are:

<table>
<thead>
<tr>
<th>Material</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lignum indigo</td>
<td>2 lb.</td>
</tr>
<tr>
<td>Madder</td>
<td>3 lb.</td>
</tr>
<tr>
<td>Bran</td>
<td>6 lb.</td>
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<tr>
<td>Lime</td>
<td>1 lb.</td>
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</tbody>
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The wood vat is first placed in the dyeing vat nearly filled with water, which is heated to between 100° and 105° F., after some hours (required to soften the wood), the bran, madder, and indigo are added, and half of the whole quantity of lime. In a few hours, if all is right, a clear blue dye is formed. If this process is proceeding well, a little more lime is added, but at intervals, so as not to check the progress of fermentation; and, if necessary, the vat is heated by steam to its original temperature, on the third day the vat should be ready for dyeing. The vat contains a clear blue dye and the process of fermentation is then repeated until the required depth of colour is obtained. By proper management of the temperature and proportion of materials required, standard results may be obtained.

Dyeing the vat nearly filled with water, the colours employed are

- 200 gallons of water
- 20 lb. ground indigo
- 40 lb. ground madder
- 1 lb. ground lime

The vat is added of 20 lb. of water, and a sufficient quantity of bran, madder, and indigo to give the desired colour. The vat is then covered with a network bag, and left to stand for 24 hours. During this time, the colour should be checked, and more water or indigo added if necessary. The vat is then ready for dyeing.

The vat is prepared as follows:

1. Prepare the indigo vat by boiling the indigo in water, and adding the necessary amount of lime and bran.
2. Add the madder and water to the indigo vat, and boil for an hour.
3. Add the bran to the vat, and boil for another hour.
4. Add the lime to the vat, and boil for another hour.
5. Add the wood to the vat, and boil for another hour.
6. Add the remaining bran and lime to the vat, and boil for another hour.
7. Add the dyestuff to the vat, and boil for another hour.
8. Add the remaining water to the vat, and boil for another hour.

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DYEING

be used. Dissolve 9 lb of yellow prussiate of potash in hot water, and add the solution to the required quantity of water, then add 14 lb of 50% sal-ammoniac, and about 6 oz. of crystals of protochloride of tin, the mixture being placed in the mixture, and the temperature of the dye-bath gradually raised to the boiling point and kept there for two hours. The blue gradually formed on the cloth requires

bleaching and brightening in a fresh bath containing an alum, potash of tin, and cream of tartar, heated to nearly the boiling point. Red prussian blues upon wool, but as it is more easily decomposed than the yellow, it is a matter of acid-alkali success. These blues are often finished off with logwood to give them a deeper tone.

Prussian blues can also be obtained on such woolen goods as manners, by a process of padding, and the use of a colour nearly identical with the so-called French or royal blue used by calico printers. A mixture is prepared as follows: Half a pound of wheel-starch is boiled with about half a gallon of water, in the thin paste thus made 13 oz. of powdered yellow prussiate are dissolved, and afterwards 6 oz. of tartaric acid, when the mixture is quite cold 1 lb. of prussiate of tin in paste is added, 13 oz. oxalic acid, and 3 oz. sulphuric acid; the whole is well mixed and strained. The woollens to be treated are first "prepared," as it is called, by impregnating them with a solution of alum, and then the above thickened mixture is applied by means of rollers, so that it shall be evenly and smoothly spread over the whole stuff, the cloth is then dried and properly pressed, which causes the acids to rise upon the prussiate, and from a nearly colourless mixture develops an intense blue, which is found to be permanently fixed in the fibre.

Aniline blues—There are several artificial blue dyes made from aniline and similar bodies, which yield very brilliant colours on wool and silk, and with a little care can be used with advantage. The process requires to be worked in a squerous solution until they have acquired a sufficiently dark tone. An artificial dye called Nicholson’s dye is very extensively used, it is prepared from the alkali in the liquor, and forms then a colourless or nearly colourless solution, with which the goods to be dyed are impregnated, they are then passed into dilute acids, which develop the blue colour.

Litmus and logwood blues—The other substances which have been used for blue colours, such, for example, as litmus, are of little importance, and are now nearly unknown to the practical dyer. A blue can be obtained from logwood which has some resemblance to indigo blue upon wool, but it is of a very low character both as to stability and shade, and is hardly ever employed by respectable dyers.

Yellow Colours.

Yellow textiles, being less pleasing to the eye, and more readily soiled, are not nearly so much in use as those dyed with the two simple colours blue and red. The chief yellow dyes, besides fustic, are quercitrin bark or its concentrated extract flavin, Avignon or Persian berries, and the most almost disused indigenous product, weld. The general mordant for these is tin, sometimes with addition of alum. One or two illustrations will suffice to show the methods employed for such goods as are obtained by the use of salts of lead and bichromate of potash.

Fustic yellow—Fustic is probably the most generally employed yellow dye-stuff for wool, it gives yellows inclined to orange. For light yellow it is not necessary to mount the wool; it is simply well cleaned, and then heated with fustic decoction and some cream of tartar. For darker shades the wool is boiled with solution of tin and tartar, washed, and then worked in the decoction of fustic.

Persie and yellow—Persie, a dye, one of the artificial colouring matters, gives pure though not deep yellow shades upon silk and wool without the aid of a mordant. The cleaned material being dyed by working it in a warm solution of the acid.

Chromate of lead yellow—The yellow most commonly employed for such goods as are obtained by the use of salts of lead and bichromate of potash. The method of obtaining this colour differs somewhat from any previously described. The cotton, having been prepared to receive the dye, is impregnated with a salt of lead, usually by employing a solution of the acetate or sub-acetate of lead. The goods are next passed into a mill of lime solution, to which it is prudent to add some acetate of lead, in order to prevent the lime from dissolving the oxide of lead at first precipitated; the result of this lime treatment is that oxide of lead is evenly fixed upon the cotton, the yellow red lead is then washed away, and the goods are passed into a solution of bichromate of potash, where they quickly acquire a bright and deep yellow colour, owing to the formation of the well-known intermittent chrome yellow calcium. To facilitate the combination, the bichromate of potash is mixed with as much sulphuric and as much as to liberate the whole of its chromic acid. The yellow-dyed goods require no further treatment than a good washing, the colour being quite fast.

This yellow is, however, in very little demand, and is mostly

cases out of a hundred it is immediately converted into an orange, so that when passing through built chimneys, the yellow-dyed goods used as chrome known as chrome orange, which has always been in demand for many articles of wear.

Compound Colours.

The so-called simple colours—red, blue, and yellow—having now been dealt with, it remains to treat of their combinations, and this may be done briefly, the processes employed being for the most part similar to those already described. The compound shades in Chevreul’s chromatic nomenclature amount to nearly 15,000, and it is very probable that fully that number are produced by the dyers of the present day. For practical treatment, however, the compound colours can be reduced to comparatively few classes. Mixing the simple colours one and one we obtain a compound colour called Lo-kao, until then known in Europe. It was a costly dye-stuff, selling in China for 12 weight of silver. Some quantity of it was imported and used in silk-dyeing, but by the French, it was not, however, applied to wool, and has at length been quite abandoned for the aniline greens, which are in every respect preferable.

Aniline green—There are two or three kinds of artificial green dye in use, of which that known as methyl-aniline green, applied in silk dyeing, is most in request. The so-called indigo green has also been somewhat extensively employed for all class of articles. These artificial and unstable materials are the only dye-stuffs for green possessed by the dyer, who is compelled to produce the colour by means of blue and yellow, but are not composed of the two separate colours blue and yellow. About that time some green-dyed cottons, imported into France from China, attracted the attention of chemists, who were surprised that they could not separate the green into blue and yellow constituents. Inquiries showed that the Chinese employed a green-colouring matter called Lo-kao, until then unknown in Europe. It was a costly dye-stuff, selling in China for 12 weight of silver. Some quantity of it was imported and used in silk-dyeing, but by the French, it was not, however, applied to wool, and has at length been quite abandoned for the aniline greens, which are in every respect preferable.

Green Colours.

Lo-kao or Chinese green—Until about the middle of the present century there was not an instance known of any green or yellow which was not composed of the two separate colours blue and yellow. About that time some green-dyed cottons, imported into France from China, attracted the attention of chemists, who were surprised that they could not separate the green into blue and yellow constituents. Inquiries showed that the Chinese employed a green-colouring matter called Lo-kao, until then unknown in Europe. It was a costly dye-stuff, selling in China for 12 weight of silver. Some quantity of it was imported and used in silk-dyeing, but by the French, it was not, however, applied to wool, and has at length been quite abandoned for the aniline greens, which are in every respect preferable.

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are nearly always composed of some of the red and yellow dyes mentioned in the preceding pages, such, for instance, as cochineal and fustic, and are supplied in one bath, the same mordant serving for both.

Arran orange.—A warm solution of arran in weak alkalies is used without mordant to impart an agreeable orange shade. In early times it was generally considered too yellow, but may be made redder by treatment with weak acids, or by previously giving the silk a yellow foundation.

Purpure and orange.—Another orange on silk can be dyed by superimposing on a light pink a yellow obtained from purpure and cochineal. Purple and orange—Silk can also be permanently stained of a yellowish orange by means of moderately strong nitric acid, and must, however, be applied with care, since a more than momentary contact would be very injurious to the strength of the fibre. This method of dying silk was formerly much used for handkerchiefs, by protecting certain parts from the acid with melted wax or similar resists, white designs being produced upon an orange ground.

Purple Colours.

The purple colours may be held to include all shades produced by an admixture of red and blue, such as for example blue, violet, mauve, &c., and are of immense variety.

Antique purples.—Since their discovery aniline dyes have been almost exclusively employed for dying silk and wool purple, yielding as they do shades which for lustre and purity surpass any obtainable from the older colouring matters, and possessing also a far greater stability. An application of the dye without mordant is all that is required, and the goods when dyed need very little subsequent treatment. The aniline purples, violets, and mordants used for dyeing on cotton without previous mordanting, and even then are so loose and unstable that they are only fitted for use where great fastness is not demanded, as for instance of clothing.

Madder purple.—But the purple colour par excellence upon cotton is obtained from madder or alizarin, the mordant being oxalate of iron, and the commercial pyroglucine of iron, commonly called iron liquor. This purple is remarkable for great permanence. It is very largely used in combination with black and white in the best kind of printed calicoes.

Arran purple.—Arran and indigo are sources of purple colours on wool and silk. The shades produced are rich and beautiful; they are not, however, very permanent, and have been nearly superceded by the aniline colours. Of the few instances that can be given of the mordant purple by the direct union of red and blue colouring matters, the violet or purple woolen cloth used for ecclesiastical purposes is an example. The indigo colour is first fixed, and then the cloth is dyed with cochineal and mordant in the way already described for dying scarlet. The purple thus obtained is a fast colour, but is very costly, and on that account is not much worked.

The common shades of purple, violet, blue, &c., upon wool are obtained from logwood with a mordant of alun and tannin, the red woods are sometimes employed in conjunction with logwood for these colours, which are “tipped” with archil to give them more brilliancy.

The extensive range of colours, comprising all the shades of brown, bronze, chocolate, nut, wood, drab, and grey, which may be considered as compounded of the three elementary colours, some of one of these predominating, can be only briefly treated of in this article. Most of them are actually produced by the use of dye-stuffs yielding the three simple colours, but there are colouring matters like catechu, which yield brown colours, and others, like logwood, which may be held to contain two or more of the simple colours, the blue predominating. A few illustrations will show how these tully compounded colours are produced by the dyer.

Brown Colours.

Brown on wood.—The wool is mordanted with alun and tannin in the usual way, and is then dyed in a mixture of fustic and logwood, or other equivalent dyes, for fast colours a blue part can be communicated to it by the indigo vat. For a lower class of colours no indigo is used, but instead, a mixture of fustic or other equivalent dyes, and with madder for the red, and logwood for the blue part, or again, the sulphate of indigo may be employed for the blue.

Brown.—According to Mr. Jarvis, the wool is mordanted by boiling it for an hour with one per cent. of its weight of sulphate of potash, it is then washed, and transferred to the dyers vessel, with the following percentages of its weight of materials—madder, 3 lb., 2½, 3½, &c., (for 44 lb.); indigo, 1 lb., 1½, 2 lb., &c., (for 44 lb.); logwood, 5 lb., 10 lb., &c. (for 44 lb.). With these materials it is boiled for two hours.

Black Colours.

Black, from a dyer’s point of view, is composed of the three simple colours, red, yellow, and blue, in a state of concentration, but in reality the blue predominates in all good black colours, and gives them their density and at the same time their lustre. What is called a dead black, a brassy black, or a jet black, is the nearest approach to a neutral black, but even this would be brownish if the blue did not predominate. It is often extremely difficult to obtain a black dye to suit a particular market. Of ten pieces appearing equally black to the untutored, an expert would, perhaps, pronounce one to be sooty, another purple, another red, another brown, another green, and so on.

We should have to go back several years in the history of dyeing, to find a time when black was actually dyed with anhrome or madder dyes. In some processes blue from indigo was first applied, and then, upon an alum mordant, red and yellow from madder and weld, and then the goods were washed and dried. For a long time there was a demand for aniline black, on account of its fastness to light, and at present there is no synthetic product that will take the place of the mordanted indigo, black or brown. Several shades of black are obtainable by the use of different mordants. The use of a mordant is not always necessary for the production of a black, as a mixture of iron and madder gives a good black, and many modern black silk dyes, with a mordant, will produce an excellent black, provided the mordant is not too strong, for it has the effect of giving the goods a certain amount of hardness and stiffness, and also of giving them fastness to light.

Black dye upon silk.—Silk easily takes a black by treatment first with decoction of gall-nuts, and subsequently with a salt of iron. For blue blacks the silk is usually first dyed with Prussian blue, and then with gall-nut black. Extract of indigo with an iron mordant gives a good yellow. In modern black silk dyes, either natural or artificial, the dye is most frequently obtained from the indigo plant; it is a blue salt, which is not only to its colour, but which increases its weight, in an extraordinary manner, so as not only to compensate for the loss of 25 per cent. of natural indigo in the silk, but even, in some cases, to double or treble the original weight. The silk is, of course, much injured by the accumulation of foreign matters upon it, the fibre becoming harsh and brittle, and soon showing the effects of wear. The chief substances used for weighting are lead salts, calcium, iron, and gall, with soap or fatty matter, to soften in some degree the hardness of the silk.

Common black.—Common blacks upon wool have no indigo in their composition, but are dyed clearly with logwood and iron salts, the wood and logwood are heated together for some time, and then sulphate of iron is added to the dye-bath. In other blacks of somewhat better quality, the wool is boiled for some time with solutions of iron, copper, and aluminium salts, together with tartar, and when the mordanting oxides have been fixed, the colour is dyed up in logwood. The logwood of mordant purple can also be used for the black dye, and the cloth can be “tipped” with camwood or barwood, it is then dyed up with logwood, to which fusling or madder may be added.

Black upon cotton.—Almost the only ordinary black in cotton dyeing is obtained from logwood with iron mordant; sometimes used, and very rarely the blacks are dyed upon an indigo blue basis by means of sumach and galls and iron. As before stated, aniline black has not yet been practically applied, but a common method is to first heat the goods for some hours with decoction of sumach, wash mordant in sulphate of iron, and then dye in logwood, another method consists of heating the cotton by the method given above (page 757), and dyeing in logwood, along with a portion of sumach or flax, according to the shade required.
applications of madder, sulphate or acetate of iron, sulphate of copper; and, finally, the end chiefly aimed at being the production of a black with blue or violet bloom. The Manchester dyers formerly held a monopoly of this blue-black upon velvet, as is called, but of late years the German dyers have shown themselves very formidable competitors in dying this class of goods.

**Theory of Dying.**

When the great variety of processes employed in dying is taken into consideration, it is apparent that there must be some difficulty in constructing a general theory which shall be applicable to every case.

The earlier writers who endeavoured to generalize the principles of the art considered that the particles of colour were mechanically deposited in the pores of the fibre. The use of chemical substances in dying was held necessary only to dilate the pores for the admission of the particles, to prepare the particles for entrance into the pores, or to close up the pores after the colouring particles had entered. Mordants were held to be necessary because they formed cavities in the fibre adapted by their axe and shape to receive and retain different kinds of coloured particles.

About the middle of the last century Bergmann, observing the dying of wool by sulphate of indigo, considered that what took place was a purely chemical action, and that the matter of the wool entered into chemical combination with the dye-stuff, changing it from a soluble into an insoluble substance, and showing therein the power of chemical affinity. From this time the mechanical or physical theory of dying was supplanted by a chemical theory, in which all the observed facts were explained by the assumption that chemical forces operated between the fibre and the mordant, or the fibre and the colouring matter. A closer consideration by a later generation of chemists of all the phenomena of dying and of the nature of the materials employed did not tend to support this theory. About 1840 Dumas, the celebrated French chemist, and Crum of Thornleibank, a skilful and a practical dyer, formally disputed the chemists' theories of dyeing and of the nature of the materials employed.

A closer consideration by a later generation of chemists of all the phenomena of dying and of the nature of the materials employed did not tend to support this theory. About 1840 Dumas, the celebrated French chemist, and Crum of Thornleibank, a skilful and a practical dyer, formally disputed the evidence of a chemical action in dying, and referred the phenomena to physical causes of attraction on the part of the fibre. Crum confined himself to the single case of the dying of cotton, and expressed himself convinced that it was owing either to surface contact of the dye stuff with the cotton or to its entrance into the hollow tubes of the same, the colours produced in the first case not being so stable as in the other, as far as resisting friction went. The power which cotton fibre evidently possesses of appropriating oxides from solutions, as well as colouring matters, such as indigo, was viewed by Crum as a case of surface attraction, similar to the power residing in charcoal of abstracting oxides and colouring matters from solutions, and he declared there was no such thing as a chemical combination between the cellulose of the cotton fibre and any of the chemical substances or dye materials. To controvert this statement is difficult, for, though the forces at work seem to be chemical forces, the products cannot be proved to be definite chemical compounds. On the other hand, the forces of catalysis, surface attraction, and powers of porous substances which Crum substitutes for the chemical forces of the older theories of dying, may be said to be merely names, without definite meaning, for indicating the existence of a class of phenomena not at all understood even at the present day. Dumas views the questions more broadly, and simply declines to accept as chemical phenomena actions which do not produce real chemical compounds. He considers that dying is more probably owing to a physical property of fibres by which they are enabled to attract and retain coloured bodies, much in the same way that a piece of charcoal does, and simply because the nature of the power by which charcoal are not accepted as chemical, and no one knows what they are, dying cannot be considered as an effect of chemical attraction or affinity. He admits, however, that there are some powers at work different from that possessed by charcoal. How is it, he asks, that wool takes up the scarlet dye so well under conditions where silk and cotton are barely tinged with colour? How is it that wool unites with the black precipitate formed with tannin and iron salts, while silk under the same circumstances is so difficult to dye? He asks, finally, how it is that certain colours can be fixed better on some fibres than others; and whether it is not by some special action, not correctly called affinity, but which at any rate is an important force, or the resultant of several forces, that this is affected. But, he continues, to confound chemical affinity, properly so called, with the phenomena of dying is to confuse two essentially different things. When silk unites with Prussian blue, or wool with indigo, the action is quite distinct from what takes place when sulphur combines with lead. But, on the other hand, again, fibres are not to be looked upon as acting simply the part of a filter in retaining colours.

Chevreuil, at a later date, insists that in the present state of our knowledge the phenomena of dyeing can be explained only upon chemical principles. He admits that colour may be and in practice is frequently deposited upon the external parts of fibres, but there are numerous cases in which a soluble salt is decomposed by fibrous matters, as when silk is steeped in persulphate of iron; and he cannot consider as anything else than chemical affinity that power which enables a solid body to decompose a solution of elements, themselves united by chemical affinity, and which without the contact of the solid body would have remained in perfect union. Many other chemists, physicists, and microscopists have occupied themselves upon this vexed question, but without evoking any generally acceptable theory of dyeing. The balance of opinion may be said to be in favour of the supposition that as far as regards the animal fibres, wool and silk, there are many cases of dying which can only be regarded as effects of mechanical forces; with respect to the vegetable materials cotton and linen, the evidence is less certain, and we must wait for further research and investigation to settle the disputed question.

**Books of Reference.**—Of the numerous works upon dyeing it may be sufficient to mention Bancroft's *Philosophy of Permanent Colours* (2d ed. 1813), Berthelot's *Eléments de la Teinture,* and Ure's translation of the same into English (1841); *Pére's Traité de l'Imprimerie par Dye* (1846),—a most complete and accurate work for its date; O'Nell's *Chemistry of Calico Printing and Dyeing* (1860), and *Dictionary of Dyeing* (1862); *Napier's Manual of Dyeing* (1860), *Dyer's Magazine* (1841); *Schützgenberger's Praktik der Farben- und Lackmischungen* (1807); *Crockett's Dyeing and Calico Printing* (1874); and *Craze-Calvert's Dyeing and Calico Printing* (1875). Of periodicals specially devoted to the application of colouring matters to textiles there is only one in Great Britain, the *Textile Colourist;* Germany has the *Färber-Zeitung* and the *Muster-Zeitung,* in France there are the *Moniteur de la Teinture* and *Le Teinturier Pratique,* occasional articles upon the subject occasionally appear in the chemical journals, and especially in the Bulletins of the Industrial Societies of Mulhouse and Bonn. C.O.W.

**DYER, John,** English poet, was born in 1699 or 1706 at Aberglassney, in Carmarthenshire, where his father, Robert Dyer, successfully practised as a solicitor. He was sent to Westminster school to be educated under Dr Friend, and was destined to succeed to his father's business. He showed, however, an inveterate dislike to the study of the law, and, having a taste for design, he induced his parents to allow him to adopt the profession of an artist. He wandered about South Wales, sketching landscapes and occasionally painting portraits. In 1726 his first poem, *Grongar Hill,* appeared in a miscellany published by Richard Savage, the poet. It was an irregular ode in the so-called Findian style, but Dyer wrote many such pieces at all ages and printed it separately in 1727. It had no immediate and brilliant success. *Grongar Hill,* as it now stands, is a short poem of only 150 lines,
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describing in language of much freshness and picturesque
charm the view from a hill overlooking the poet's native
cave of Towy. Artificial in an affected age, the natural
images which crowd upon one another in this charming
little poem are as admirable now as when they were
written, and hold an assured place in English literature.
Dyer's ambition to succeed as a painter impelled him to
visit Italy, and about ten years after the publication of
Grongar Hill he seems to have attained this great desire,
and to have spent some time in the south of Europe. It
was in consequence of this tour that he wrote his next poem,
The Ruins of Rome, a descriptive piece in about 600 lines
of Miltonic blank verse. In this work the phraseology is
pompous and conventional, but there is considerable know-
ledge displayed, and the ardour of a true lover of antiquity
The Ruins of Rome appeared in 1740, and increased its
author's reputation. Having fallen into bad health while
painting in the Campagna, and finding that he was not
destined to excel in the practice of art, he determined to
enter into holy orders. In 1741 he was ordained by the
bishop of Lincoln, and presented with the living of Caldey
in Pembrokeshire. He was married about this time to a lady descended from the brother of
Calthorpe, in Leicestershire. He
published The Poems of Amwell, who
his genius was
In 1751 he was translated to the
bishop of
rural Kirby-on-Bane.

Caius, in Lincolnshire, to which was added

In 1756 he exchanged Belchford for the
weathered incumbency of Kirby-on-Lane. In 1757 he
published his longest work, the didactic epic of The Fleece,
in four books, of which the first described of the tending
of sheep, the second of the shearing and preparation of the
wool, the third of weaving, and the fourth of trade in
woollen manufactures. The subject was prophy, and the
stately blank verse in which it was discussed gave the poem
a ridiculous air. The town took no interest in it, and the
wits facetiously prophesied that "Mr Dyer would be buried
in flannel." He did, in fact, very shortly afterwards follow
his poem to the grave, for he died of consumption on the 24th
of July 1763, leaving a wife and four children. After his
death his genius was defended and his writings analyzed by
Scott of Anwell, who published a commentary on Dyer's
poems. The latter were collected by Dodsley in 1770, but
they only form one small volume. Grongar Hill has been
compared with Sir John Denham's Cooper's Hill, which
may in some measure have suggested it. These two pieces
remain the most important topographical poems in English
literature, if we exclude Ben Jonson's Persia.

DYNAMICS properly means that science which treats
of the action of forces. Defining forces as that which affects
the motion of matter, it appears that the study of dynamics
will lead to the consideration of the motion of material
systems, and the laws in accordance with which this motion
is changed by the mutual actions of the bodies forming
such systems. But there is a sense in which we may con-
template the geometrical results of the motion of bodies
without studying the forces under which, or the time
during which, it takes place; and hence there are many
problems which at first sight we might be disposed to include
under the term of dynamics, but which also belong to
the domain of pure mathematics, and may therefore more pro-
perly be considered as a branch of geometry. On the
other hand, there is a branch of dynamics which treats
of pure motion without taking any account of its subject
or the means by which it is produced or changed. In this
branch, to which the term kinematics, though first employed
by Ampère in a wider sense, may with propriety be confined,
it may seem that no consideration of matter or of force is
involved; but, unlike the class just alluded to, the
problems which come under this head involve explicitly the
element of time, and it is only after studying the laws of
dynamics that we are able to furnish a theoretical measure
of time satisfying the demands of the human mind. Thus
any subject in which the measurement of time is involved
enters on this account into the domain of dynamics.

Measurement of Time.—For ordinary purposes the rota-
tion of the earth furnishes a sufficiently exact means of
measuring time, and the observation of the transit of
a known star is the best method we possess of determining
the error of a clock, but that the fundamental conception
of the measurement of intervals of time is based upon other
foundation than the diurnal rotation of our planet at once
appears from the fact that we see no inconsistency in asking
whether the length of the day is the same now as it was
2000 years ago. If our primary conceptions of the measure-
ment of time were derived from the earth's rotation, the
absolute constancy of the length of the day would be a matter
of definition. But it is not to the motion of the earth or
to any other single body that we are indebted for our
highest conception of the measurement of time—it is rather
to the dynamical principle expressed in the first law of
motion, and hence it is that the theoretical measurement
of time, and of other physical quantities which explicitly
involve time, must find a place under the head of dynamics.
Kinetematics may therefore properly be treated as a branch
of dynamics, and for its discussion, as well as for the
enunciation and explanation of the laws of motion, the
reader is referred to the article on Mechanics.

Perhaps there is nothing which appears to present a
subject for study simpler than that afforded by the properties
of space, and hence it is that geometry attained so high a
reputation and made such rapid advances among the
ancients. It was easy to construct material standards of
length and by their means to measure approximately the
linear dimensions of limited portions of space, the human
mind being only too ready to believe in the constancy of
the dimensions of the standards constructed; and thus the
properties of space presented a subject which, at the very
outset, afforded a facility for investigation which was want-
ing in the study of other physical quantities. The great
simplification introduced by this belief in the permanence
of the dimensions of material standards will be apparent if
we consider the position in which we should be placed by
the adoption of a different hypothesis. Once admit the
supposition that the properties of a figure, as regards
dimensions or form, depend explicitly on its position in
space, or upon time, either by a process of growth in them-
sew or because space is changing its character, and the
whole subject of geometry will require reconsideration.

Displacement.—A number of points or figures may be
connected in accordance with such geometrical conditions
that if one or more be displaced in a given manner the
displacements of all the others may be determined. The
determination of the displacement of each in terms of the
given displacements as a problem in pure mathematics, and
the branch of geometry which treats of such questions may
be called the science of displacement. If we suppose the
figures here contemplated to be material bodies, and the
geometrical conditions to be determined by means of
material constraints such as links, pulleys, teeth, and the
like, the science of displacement thus applied becomes that
of mechanism, and it is only necessary here to call attention
to the following statements. First, in the study of dis-
placements, or of pure mechanism, no account is taken of
any but the geometrical properties of the bodies displaced,
while the forces engendering the displacement are entirely
neglected: the consideration of the mechanical
properties of the materials of which the parts of a machine
are constructed, the forces acting between those parts, and
the best means of fitting them, belong to the science of
mechanics and machine construction. Secondly, the ele-
ment of time is altogether left out of consideration; for,
although it may be argued that the displacement of each part of the system takes place in the same interval of time, and that the geometrical condition of the displacement experienced by different parts during the same time, and thus lead us to a comparison of velocities, yet it must be observed that this is only a comparison amounting simply to a relation between corresponding displacements, and does not imply that the whole displacement may take place in a time as long or as short as we please, for we do not consider it. Moreover, the actual motion of any part may be made uniform or varying in any arbitrary manner without any account being taken of it. In fact it is simply two or more configurations of the material system which are compared together, and, though for the sake of distinction we call one the initial and another the final configuration, we might as well distinguish them in any other manner and without stating which follows the other. Indeed we contemplate them as co-existing during the act of comparison. Hence we may complete the science of displacement or pure mechanism without ever considering forces, or being able to measure time or even to define equal intervals.

Kinematics.—If to our conceptions of space and of displacement we couple that of time as a measurable quantity, we are led to believe that the rates of non-simultaneous as well as of simultaneous displacements, and are consequently obliged to measure the rate at which displacement occurs by the change of position experienced in a definite interval of time by the body, figure, or point we are regarding. Hence the association of our conception of space with that of time as a measurable quantity opens up to us that branch of dynamics which we call kinematics.

Matter.—Having considered displacement in connection with the laws during which it occurs, the next step leads us to take account of the thing displaced, and here we are obliged to contemplate matter directly. Matter, like time and space, we do not attempt to define, but treat it as a primary concept, its more obvious properties making themselves known to all through daily experience. The next step in the same direction is the consideration of the rate at which velocity changes, or acceleration, and thus the association of our conception of space with that of time as a measurable quantity opens up to us that branch of dynamics which we call kinematics.

The sciences of dynamics in its restricted sense is that which treats of the consequences arising from the relations of matter to force, and before we can proceed in this science beyond the first step we must become acquainted with the second law of motion, which is the first law of motion, its range being thereby sharply defined and separated from that of the rest of dynamics. The laws of motion, like other natural laws, must be understood to express merely the properties of natural bodies as we find them, and within the degree of accuracy to which our experiments can be relied on. We might, of course, have started with any hypotheses we liked respecting the relations of force to matter, and upon these hypotheses and our conceptions of time and space have constructed a purely theoretical system of dynamics which would have been perfectly self-consistent; but our conclusions might, or might not, have agreed with observations of natural phenomena. If we found an agreement between the results of the application of our theory to special problems and the solutions of the corresponding problems as worked out objectively in nature, we should have reason to believe that our hypotheses agreed with the facts, or, in other words, that they were true, and we should then raise them to the dignity of natural laws. It is on evidence of this kind that our acceptance of all natural laws is based. If our conclusions were inconsistent with natural phenomena our system of dynamics would be an abstract, instead of a natural, science—if, indeed, it might be called a science at all—and would be valuable merely as an intellectual exercise. In the case of such an abstract science we are not even bound to adopt the axioms respecting the properties of space which are usually accepted, but may confine upon our "space" any number of dimensions and any properties we please.

Stress.—Though the conception of a single force is convenient, it nevertheless results from a mere process of mental abstraction. We never meet with a single isolated force in nature, but each is accompanied by an equal and opposite force acting in the same straight line, and when we speak of one without the other we do so merely for the sake of brevity. The third law of motion implies this statement, though it has also a wider signification. The action and reaction which are thus always inseparably linked together may be conveniently called a stress, of which the two forces are opposite aspects. Thus it appears that there is nothing in nature corresponding to what we are accustomed to call a single force; stresses, indeed, abound, and may be produced whenever we please, but we are completely ignorant of their existence except when they change the relative velocities of different portions of matter. Then, and then only, do they appeal to our senses.

Statics.—The investigation of the conditions under which a system of stresses produces no displacement of the bodies between which they act constitutes the science of statics, and will be discussed under the head of mechanics.

Measurement of Force.—Since force can be defined in terms of space, time, and matter, it follow that the measurement of a force ought to involve measurements of these three quantities and of them only. Now it is plain that any force whatever may be chosen as the unit in terms of which other forces should be expressed, provided it is capable of being reproduced at all times and in all places with precision. We all now believe that the region of space which we inhabit is sufficiently homoloidal to allow us to compare distances in different directions, at different places, and at different times. Moreover, the first law of motion, as has been stated above, provides, when proper precautions are taken, a method of measuring time which satisfies the requirements of the mind, while the rotation of the earth affords a practical measure of time sufficiently exact for the most refined experiments we can execute. Therefore a unit of force which depends only on the units of length, mass, and time will be the same at all places, and, so far as our experience allows us to judge, at all times. Such a unit is termed an absolute unit. Not only force but every other quantity dealt with in dynamical science, as well as every physical quantity whose relations to space, mass, and time are known, can be measured in terms of a unit of its own kind which depends only on the fundamental units of length, mass, and time, and is then said to be expressed in absolute measure. The three primary units must be chosen in an arbitrary manner, and their permanence must be considered a matter of definition; but when these have been once fixed, all the absolute units derived from them are perfectly determinate and invariable. If a foot, a pound, and a second be chosen as units, the corresponding absolute unit of force is called a pound; while if the primary units be a centimetre, a gramme, and a second, the unit of force is called a dyne,
For the definitions of the derived dynamical units and the investigation of their dependence on the fundamental units, the reader may refer to the article on Mechanics.

From what has been said it will appear that the whole difficulty in fixing upon a system of dynamical units lies in the determination of the fundamental units of mass, time, and space; and time in such a manner that their constancy can be relied upon. The unit of mass offers very little difficulty in this respect. Long experience has taught us which are the most permanent of the varieties of matter we have at command. We have good reason to believe that a piece of platinum or an alloy of platinum and iridium may be exposed to pure air at ordinary temperatures for an indefinite time without any increase or diminution of its mass whatever. Such a piece of metal may therefore with propriety be chosen as a national standard of mass, the absolute constancy of the quantity of matter constituting it being accepted on definition, as we are unable to test it by any standard in which we have more confidence than we have in itself. The British and French national standards of mass are of platinum, but the new standards recently constructed in Paris consist of an alloy of platinum and iridium.

The determination of a unit of length is not so simple as that of the unit of mass. In this case, as in the preceding, we avail ourselves of the properties of a material standard, but we know that however indestructible the standard itself may be its dimensions depend upon the pressure to which it is exposed, its temperature, and in some cases upon other accidents, such as the magnetic force in the neighbourhood, &c. Hence the only course open to us is to determine as far as possible all the causes of variation in the length of our standard, and carefully to define its condition with respect to these variables, so that it shall be a standard only under the circumstances thus defined. Having thus defined the condition of the material standard with respect to all the variables upon which the unit is dependent, we must consider the absolute constancy of its length at all times and places to be a matter of definition until we have discovered other causes which affect it. It has been proposed that the wave length of a few of a particular kind of light, as for instance that corresponding to one of the sodium lines, should be taken as the unit of length, and its period as the unit of time. These units are probably more constant than those afforded by any material standards or vibrating springs which we can construct; but a belief in their absolute constancy implies complete confidence in the constancy of the properties of the interstellar medium, and of the sodium molecule.

The determination of a satisfactory means of measuring time seems to offer greater difficulties than the measurement of mass or of space, though the difficulties are of the same character as those we have just considered. The great difficulty consists in defining what is meant by the equality of two intervals of time which do not commence simultaneously. Remembering that it is upon the properties of matter alone that we can rely for assistance, we might construct a spring and define as equal lapses of time those intervals during which this spring executes the same number of vibrations, the temperature, &c., being kept constant. But if we were to construct a number of such springs, though a perfect agreement might obtain between them at first, we should find after a considerable period that the measurements of time derived from different springs did not agree, while our knowledge is insufficient to enable us to apply to each the corrections necessary to lead us to a common result. Now these corrections may be no reason why we should prefer one spring above all the others, and thus it appears that a definition of equal intervals of time based upon the behaviour of any single spring is too arbitrary to be satisfactory. If, however, we found a large number of springs, constructed of different materials and differently affected by temperature and other known causes of variation, continue to give perfectly consistent results, the theory of probability would lead us to place a high value upon the measure of time thus afforded. Now, we have stated that our highest conception of the measurement of time is derived from the dynamical principle expressed in the first law of motion, but when we come to apply this it is impossible to determine a priori whether in the case of two given bodies there is no stress acting between them or between one of them and some third object. Consequently, the only course open to us is to examine the motion of a large number of material systems, making such corrections for the action of stresses which we know to be in operation as our theoretical dynamics will enable us to determine; and, if after this we find that several independent systems afford the same measurement of time, while those systems which lead to a different result disagree also among themselves, we must accept the measurement of time afforded by the first set as the true measure, and attribute the discrepancies manifested by the other systems to some unknown stresses, which it should be our subsequent business to discover.

Work—The contemplation of a stress, together with a relative displacement of the portions of matter between which it acts, introduces us to the conception of work. If we consider a stress, together with the distance through which the solicited bodies are capable of moving relative to one another in obedience to the stress, the object of our contemplation is the work which may be done under the given conditions of the system, and thus we call energy. The subject of which natural philosophy treats is the transformation of energy, which in all its phases takes place in accordance with two great principles, known respectively as the principles of the conservation and the dissipation of energy. Of these two principles the former rests upon a much higher scientific basis than the latter. In order to lose our faith in the principle of the conservation of energy we must give up our belief in the fundamental principles of dynamics expressed in the laws of motion, but as regards the dissipation of energy we can say little more than that all the operations of nature with which we are acquainted take place in accordance with this principle. Clerk Maxwell has, however, shown that it is possible to subvert the principles of the dissipation of energy under the case of a sufficiently high order of intelligence. For the statement and discussion of these two principles see ENERGY.

It is the work of the natural philosopher to explain the operations of nature in accordance with the principles of dynamics, and we consider that we understand any phenomenon when we have shown it to consist of a motion of matter and determined the character of this motion. Thus it is that dynamics forms the foundation of every branch of natural philosophy, and a thorough appreciation of the principles of conservation and dissipation of energy is the only safe guide in physical investigations. (W. O.)

DYNAMITE (δυνάμως, strength), the name applied to various explosive preparations containing nitroglycerin. The first practical application of nitroglycerin, discovered by Sobrero in 1847, was employed by Alfred Nobel, who in 1863 used gunpowder soaked with it for blasting. In 1864 he found that it could be exploded by the intiative detonation of fulminating materials; and in 1867, owing to the uncertainty and danger attending its employment, he conceived the idea of mixing it with some solid and adhesive substance. The silexaceous infusorial earth called in Germany Kieselgur proved to be well adapted for this purpose, since it took up as much as three times its weight of nitroglycerin without becoming more than damp to the
The mixture of earth and nitroglycerin, to which was added a little alkaline material to neutralize any acid that might be set free by the latter, was termed by Nobel dynamite. Ignited in the open air, dynamite burns slowly, but it is as readily exploded as nitroglycerin itself by means of a detonating fuse; and, though not equal in bursting or breaking power to uncombined nitroglycerin, on account of the absorption by its port constituents of part of the force developed in the exploding shock, it is greatly superior to gunpowder, instead of which or gun-cotton it is employed in blasting coal and stone, removing piles, felling trees, and clearing stumps from forest-land. It may also be used with advantage for the destruction of cannon and for breaking up large iron casings (see Comp. rend., lxxi. 770). For filling holes in the pasty consistency renders it a very convenient material.

In continuous masses dynamite transmits detonation at the rate of from 15,500 to 21,600 feet a second. Concentration is not requisite for its explosion, and it can be used in damp situations without to any great extent impairing its action. It explodes if heated in a closed brass case, also on sharp percussion when placed between two metallic surfaces; it should not, therefore, be kept in hermetically sealed receptacles of metal or other very solid material. A low temperature detonates loses its tendency to spontaneous detonation. The best absorbing agents are kaolin, tenement is not requisite for index, and to the other a small lever, which acting on the what analogous to that which was a desert, applied to a cave on the sea-shore which was occupied about 449 by St Berf or Sanctus Servanu, to whom at a later date the church was dedicated. From James V the town received the rights of a royal burgh. In the 16th and 17th centuries it was the seat of a great manufacture of salt, and besides dealing in coal and stone, removing piles, felling trees, and dynamite, the result of the earl of Rosslyn. As a parliamentary borough Dysart is a member of the Kirkcaldy district. The population of the town in 1871 was 2476.

Dysart is mentioned as early as 874 at the time of a Danish invasion. Its name is said to be a corroboration of the Latin desertum, a desert, applied to a cave on the sea-shore which was occupied about 449 by St Berf or Sanctus Servanu, to whom at a later date the church was dedicated. From James V the town received the rights of a royal burgh. In the 16th and 17th centuries it was the seat of a great manufacture of salt, and besides dealing in coal and stone, removing piles, felling trees, and dynamite, the result of the earl of Rosslyn. As a parliamentary borough Dysart is a member of the Kirkcaldy district. The population of the town in 1871 was 2476.

DYSART, a seaport town and royal and parliamentary burgh of Scotland, in the county of Fife, nine miles north-east of Burntisland, with a station on the North British Railway. It consists mainly of three narrow streets with a square in the centre, and on the whole has rather a dull and deserted appearance. In the High Street there are a number of antique houses with inscriptions and dates; and towards the south side of the town there are remains of an ancient chapel. Besides the old parish church with its tower, there are six places of worship, an old town-house, a mechanics' institute, and a combination poorhouse. The harbour is tolerably good, and there is a wet dock attached. The staple industry is the manufacture of linens and ticks; but flax-spinning and ship-building are also carried on, and there is a large export of coal. To the west of the town is Dysart House, the residence of the earl of Rosslyn. As a parliamentary borough Dysart is a member of the Kirkcaldy district. The population of the town in 1871 was 2476.

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DYRRACHIUM. See DURASSO.

DYRENTY (from the prefix δυρχή and δυρχω, the intestine), also called Bloody Flux, an infectious disease with a local lesion in the form of inflammation and ulceration of the lower portion of the bowels.

Although at one time a common disease in Great Britain, dysentery is now very rarely met with there, and is for the most part confined to warm countries, where it is the cause of a large amount of mortality.

Dysentery in a sporadic form may occur anywhere, but the variety of the disease is believed to depend on a different cause from that to which it is due where it prevails endemically or spreads as an epidemic; for, while isolated cases appear capable of being excited by irritating causes which act locally on the alimentary canal, and may thus be developed out of an ordinary intestinal catarrh, the dysentery of tropical climates is generally regarded as owing its origin to a specific poison of the nature of a minor or germ, somewhat analogous to that which is believed to be the cause of malignant cholera. How, and under what circumstances, the dysentery poison is generated is still a matter of uncertainty. The frequent association of dysentery with intermittent fever has long been remarked, and has led to the belief on the part of many in a malarial origin for the disease. It is, however, doubtful whether a causal relationship can be established between them (although a malarial form of dysentery is a well-marked variety of the disease), since dysentery may be found prevailing where no evidence of malaria can be detected. At the same time
certain characters of climate and soil are known to favour the increase and propagation of dysentery. Long continued high temperature of the air and ground, such as exists in the tropics, together with a soil of swampy character, are the conditions generally present where dysentery prevails endemically, and where it is propagated as an epidemic; these factors are seldom absent. Among other causes well recognized as favouring the spread of epidemic dysentery are impure air and water, improper and insufficient food, unripe fruit, excessive indulgence in alcoholic liquors, and exposure to chills in warm weather, all or many of which have been often found connected with the propagation of dysentery among large bodies of people, as in the case of armies, where also the disease has been frequently associated with outbreaks of scurvy.

The contagiousness of epidemic dysentery is generally admitted, and it is probable that in this disease as in cholera the vehicle of its transmission is contained in the matter discharged from the bowels of those affected.

Dysentery manifests itself with varying degrees of intensity, but in well-marked cases the following are the chief symptoms. The attack is commonly preceded by certain premonitory indications in the form of general ill-health, loss of appetite, and some amount of diarrhoea, which gradually increases in severity, and is accompanied with griping pains in the bowels (formaem), the discharges from the bowels succeed each other with great frequency, and the painful feeling of pressure downwards (tenesmus) becomes so intense that the patient is constantly desiring to defecate. The matters passed from the bowels, which at first resemble those of ordinary diarrhoea, soon change their character, becoming scanty, mucous or alimy, and subsequently mixed with, or consisting wholly of, blood, along with shreds of exudation thrown off from the mucous membrane of the intestines. The evacuations possess a particularly offensive odour characteristic of the disease. Although the constitutional disturbance is at first comparatively slight, it increases with the advance of the disease, and febrile symptoms come on attended with urgent thirst and scanty and painful flow of urine. Along with this the nervous depression is very marked, and the state of prostration to which the patient is reduced can scarcely be exceeded.

Should no improvement occur death may take place in from one to three weeks, either from repeated losses of blood, or from gradual exhaustion consequent on the continuance of the symptoms, in which case the discharges from the bowels become more offensive and are passed involuntarily.

When, on the other hand, the disease is checked, the signs of improvement are shown in the cessation of the pain, in the evacuations being less frequent and more natural, and in relief from the state of extreme depression. Convalescence is, however, generally slow, and recovery may be imperfect—the disease continuing in a chronic form, which may exist for a variable length of time, giving rise to much suffering, and not unfrequently leading to an ultimately fatal result.

Several varieties of dysentery are described in which the symptoms are modified by the association of the disease with other morbid conditions. Thus the form known as Malarial Dysentery is complicated with febrile attacks of an intermittent character, and is frequently attended with hepatic, renal, and resultant affections; while it is most successfully treated by remedies which are of value in malarial diseases, such as quinine. Again, in Scorbutic Dysentery the attack is accompanied with the great prostration characteristic of scorbutus, and also with dangerous hemorrhage. Malignant Dysentery is the term applied to those cases where all the symptoms are present in great intensity, and progress rapidly to a fatal termination. Such cases are often attended with gangrene and sloughing of the mucous membrane of the affected portion of the bowel.

The dysentery poison appears to exert its effects upon the glandular structures of the large intestine, particularly in its lower part. In the milder forms of the disease there is simply a congested or inflamed condition of the mucous membrane, with perhaps some inflammatory exudation on its surface, which is passed off by the discharges from the bowels. But in the more severe forms ulceration of the mucous membrane takes place. Commencing in and around the solitary glands of the large intestine in the form of exudations, these ulcers, small at first, enlarge and run into each other, till a large portion of the bowel may be implicated in the ulcerative process. Should the disease be arrested these ulcers may heal entirely, but occasionally they remain, causing more or less disorganization of the coats of the intestines, as is often found in chronic dysentery.

Sometimes, though rarely, the ulcers perforate the intestines, causing rapidly fatal inflammation of the peritoneum, or they may erode a blood vessel and produce violent hemorrhage. Even where they undergo healing they may cause such a structure of the calibre of the intestinal canal as to give rise to the symptoms of obstruction which ultimately prove fatal.

The occurrence of abscess of the liver in connection with attacks of dysentery is frequently observed. It has been ascribed to the passage of malarial material from the diseased intestine into the liver, but by many high authorities is regarded more as a coincidence, depending upon the same climatic causes as those which predispose to the dysentery.

Treatment.—Where the disease is endemic or is prevailing epidemically, it is of great importance to use all preventive measures, and for this purpose the avoidance of all causes likely to precipitate an attack as to be enjoined. Exposure to cold at night, the use of unripe fruit, and intemperance in eating and drinking should be forbidden; and the utmost care taken as to the quality of the food and drinking water. In houses or hospitals where cases of the disease are under treatment, disinfectants should be freely employed, and the evacuations of the patients removed as speedily as possible. In the milder varieties of this complaint it is as well to avoid those occurring sporadically, and where the symptoms are probably due to matters in the bowels setting up the dysenteric irritation, the employment of diaphoretic medicines is to be recommended, and the administration of such a laxative as castor-oil, to which a small quantity of laudanum has been added, will often, by removing the source of the mischief, arrest the attack. In the severer forms of the disease, those, namely, occurring in warm climates, the remedy most to be relied on is ipecacuana. This drug, which has long known as possessing special efficacy in dysentery (and was originally introduced into this country from Peru as the radix anto-dysenterica), has proved of signal value in the treatment of the disease in India, and, as shown by Dr Maclean, has diminished the mortality to a remarkable extent. It is administered in full doses of 25-30 grains, which are repeated in from six to ten hours, gradually lessening the quantity; the effect observable is a diminution in the pain, and in the frequency and offensive character of the stools, along with the accession of prouse perspiration and quiet sleep. Hot fomentations applied to the abdomen are of use in relieving the tenesmus. Ice may be freely taken to allay thirst. The diet should be light, consisting of soups and farinaceous food. In malarial dysentery quinine is the most successful remedy, ipecacuana being generally found to be inapplicable, while in a scorbutic dysentery the treatment must bear reference to the deprived condition of the general health characteristic of scorbutus. In this form
of the disease the fresh bael or bael fruit (Eugle Marmelo-
la) is largely used in India. In chronic dysentery the
administration of astringents such as Dover's powder may
be of service, but the chief points to be attended to are
the nourishing of the patient and the observance of judicious
hygienic measures, such as the due clothing of the body,
the use of tonics, baths, &c. A change to a cooler climate
often proves of great value.

DYSPEPSIA (from dys, and 
epa, to digest), or In-
digestion, is one of the most common of all complaints,
but, from its intimate connection with various other morbid
conditions, the term is somewhat vaguely employed.
There are comparatively few diseases of any moment where
some of the phenomena of dyspepsia are not present as
associated symptoms, and not unfrequently these exist to
such a degree as to mask the real disease of which they are
only complications. This is especially the case in many
organic diseases of the alimentary canal, in which the
symptoms of dyspepsia are often the most prominent. In
its restricted meaning, however (and it is to thus that the
present brief notice applies), the term is used to describe a
functional derangement of the natural process of digestion,
apart from any structural change in the organs concerned
in the act. The causes of this ailment are very numerous,
but are generally regarded as bearing reference either to
the quantity of the gastric juice, or the move-
ments of the stomach during the process of digestion.
Among the causes connected with the food are not only
the indulgence in indigestible articles of diet, but the too
common practice of eating too much of what may be other-
wise wholesome and digestible, irregular or too fre-
quent meals, and imperfect mastication of the food. Sub-
stances which are badly cooked, or too hot or too cold, the
excessive use of condiments, the partaking of too much
liquid with a meal, and over indulge in tea, tobacco, and
alcoholic liquors are likewise fruitful sources of dyspepsia.
Morbid states of the gastric juice readily give rise to
dyspepsia. This fluid may be changed in quality or be altered in character by the presence of too much acid,
or by deficiency in its active digestive principle, pepsine.
These conditions are often connected with actual disease
of the mucous membrane of the stomach, but they may also
exist in advanced life, in depraved states of the general
health (as in rheumatism, gout, Bright's disease, anemia,
&c.), or in constitutions weakened by fatigue, over-anxiety,
or debauchery. It must, however, be borne in mind that
not only the gastric juice but the other digestive fluids,
such as the saliva, bile, pancreatic and intestinal juices,
may by defects in their amount or quality materially hinder
the process of digestion. Further, dyspepsia may be the
result of a perverted condition of the natural movements
of the stomach during digestion,—whereby, on the one hand,
owing to increased activity of its propulsive power, the
food may be carried into the intestines in a half dissolved
state, and give rise to many of the symptoms of indiges-
tion, or, on the other hand, from a weakened or atonic
state of the muscular coats of the stomach digestion may
be retarded, and the food retained and excite discomfort and
pain consequent on its undergoing fermentive and puta-
factive changes.

The symptoms of dyspepsia, even when due to a like
cause, are so numerous and diversified in different indi-
viduals that probably no description could exactly
represent them as they occur in any given case. All that
can be here attempted is to mention some of the more
prominent morbid phenomena usually present in greater or
less degree.

When the attack is dependent on some error in diet,
and the dyspepsia consequently more of an acute character,
there is often pain followed with sickness and vomiting of
the offensive matters, after which the patient soon regains
his former healthy state. What are commonly known as
"bolic attacks" are frequently of this character. In
the more chronic cases of dyspepsia the symptoms are
somewhat different. A sensation of discomfort comes on
shortly after a meal, and is more of the nature of weight
and distension in the stomach than of actual pain, although
this too may be present. These feelings may come on after
each meal, or only after certain meals, and they may arise
irrespective of the kind of food taken, or only after certain
articles of diet. As in most of such cases the food is long
retained in the stomach, it is apt to undergo fermentative
changes, one of the results of which is the accumulation of
gases which cause flatulence and eructations of an acid or
foul character. Occasionally quantities of hot, sour, taste-
less, or bitter fluid, or mouthfuls of half-digested food,
regurgitate from the stomach. Temporary relief may be
obtained when another meal is taken, but soon the uncom-
fortable sensations return as before. The appetite is
often diminished, but may be little impaired; the tongue
is in general large and flabby, and more or less furred.
In some forms of this complaint, however, particularly
where there is great irritability of the stomach, the tongue
is abnormally red. There is generally obtinate constipa-

Numerous disagreeable and painful sensations in other
parts are experienced, and are indeed often more dis-
tressing than the merely gastric symptoms. Pains in
the chest, shortness of breathing, palpitation, headache,
giddiness, affections of vision, coldness of the extremities,
and general languor are common accompaniments of
dyspepsia; while the nervous phenomena are specially
troublesome in the form of sleeplessness, irritability, despondency, and hypochondria.

A disease of this nature, interfering as it does with
the assimilative and nutritive processes, must necessarily
exert an evil influence on the general health, and there is
reason to believe that many serious ailments owe their
origin to persistent dyspepsia. This is notably the case
as regards phthisis; for although dyspeptic symptoms
often present themselves as complications induced by the
disease, yet it cannot be doubted that long-continued indigestion, particularly in youth, must have the effect of
favouring the occurrence of consumption in persons at all
predisposed to it.

Dyspepsia appears to be in some cases hereditary. In
its chronic form, this disease may long resist treatment, but
it is always in some measure influenced by the diet and
regimen and by the occupation of the patient. As a rule
persons of sedentary pursuits and brain-workers suffer more
from dyspepsia than those leading active lives.

As regards treatment only a few general observations can
be made. The careful arrangement of the diet is a matter
of first importance. Quantity must be regulated by the
digestive capabilities of the individual, his age, and the
demands made upon his strength by work. There is little
doubt that the danger is in most instances on the side of
excess, and the rule which enjoins the cessation from eating
before the appetite is satisfied is a safe one for dyspeptics.
Due time, too, must be given for the digestion of a meal,
and from four to six hours are in general required for this
purpose. Long fasts, however, are nearly as hurtful as too
frequent meals. Of no less importance is the kind of food
taken, and on this point those who suffer from indigestion
must ever exercise the greatest care. Every article of diet
which past experience has proved to disagree should be
shunned, since what may appear trifling indiscretions to
this respect are often productive of great and prolonged
suffering. The tables which have been framed to show the
relative digestibility of various kinds of food, and which
have been founded largely on the observations of Dr Beaumont in the celebrated case of Alexis St Martin, are only valuable within certain limits when applied to the treatment of dyspepsia. It must be borne in mind that idiosyncrasy often plays an important part in digestion, and some persons being unable to partake without injury of substances which are generally regarded as wholesome and digestible. Difficulty, too, is often experienced in dealing with dyspeptics from their aversion to, or want of appetite for, those forms of diet which appear most suitable for them. Experience has shown that in this complaint no particular kind of food is absolutely to be relied on, but that in general the best diet is one of a mixed animal and vegetable kind simply but well cooked. The partaking of many dainties, of highly seasoned or salted meats, raw vegetables, newly baked bread, pastry, and confectionery, are all well known common causes of dyspepsia, and should be avoided. When even the simple diet usually taken is found to disagree, it may be necessary to change it temporarily for a still lighter form, such as a milk diet, and that even in very moderate quantity.

General hygienic measures are highly important, since whatever improves the state of the health will have a favourable influence on digestion. Hence regular exercise in the open air, early rising, and the cold bath to be strongly recommended.

The medicinal remedies for dyspepsia are exceedingly numerous, and a few only of them can be mentioned. Attacks brought on by errors in diet are generally relieved by small doses of rhubarb and bismuth, and by the use of small quantities of light and bland food. In chronic dyspepsia the treatment must depend on the cause of the disorder, as far as that can be ascertained. When the dyspepsia is of the atomic form without much irritability of stomach, bitter tonics such as nux vomica, calumba, gentian, or quassia, along with some of the mineral acids taken before, with, or immediately after a meal will be found highly serviceable, while on the other hand, when there is gastric irritation with acid eruptions, sickness, and pain, the medicinal hydrocyanic acid along with bismuth, and antacids taken after food will often afford relief. Pepsin is a remedy of undoubted value in many cases of dyspepsia, and appears to supply the place of that ingredient of the gastric juice when it is deficient in amount. It may be given along with a meal, alone, or in conjunction with diluted hydrochloric acid, which also is a remedy of great efficacy in indigestion. Strict attention must ever be paid to the regular action of the bowels, and where laxatives are required an aloetic dinner pill, or, what is often better, one of the mineral bitter waters (such as that of Frederickshall) which are now so commonly used, should be had recourse to.

The employment of alcoholic stimulants to assist digestion is largely resorted to both with and without medical advice. While it seems probable that in certain cases of atomic dyspepsia, particularly in the feeble and aged, the moderate administration of alcohol has the effect of stimulating the secretion of gastric juice, and is an important adjuvant to other remedies, the advantages of its habitual use as an aid to digestion by the young and otherwise healthy is more than questionable, and it will generally be found that among them those are least troubled with indigestion who abstain from it. See PHYSIOLOGY and DIETETICS (q.v.).

DYVEKE, in German often Diewerke, and in the Latin chronicles Columbella, the "Little Dove," the name by which the mistress of Christian II. of Denmark is invariably designated. Her father was a certain Sigbrit Villams, who had been obliged for political reasons to leave his native country of Holland. Settling at Bergen, he opened an inn, which soon became known for something more than the hospitality of the host or the excellence of his cheer. His daughter's beauty was bush enough for his weakest wine. Valkendorp, the chancellor, did not think it unbecoming of his princely character to sound her praise in the ears of the young crown-prince, and accordingly, when he visited Bergen in 1507, the prince made a point of seeing the "Little Dove" for himself. In matters of this sort there is unquestionably a royal road, and so having danced with her at a ball or two, he had little difficulty in getting her to leave the inn for a house of her own at Oslo. She followed him to Copenhagen on his accession in 1513, and both her father and mother obtained unusual influence at court. In 1515 the young king, indeed, was constrained from reasons of state to marry Isabella, the sister of Charles V., but in spite of the emperor's remonstrance, his relations with Dyveke and her parents underwent no real alteration till her sudden death in 1517. That she had been poisoned was the natural verdict of the popular feeling; and the royal suspicion fell on Torben Ox, warden of the castle of Copenhagen, who was known to have made love to the girl before she was carried off by the prince; and was it not true that two days before her death he had sent her a present of cherries? It mattered not that the culprit was declared innocent by the royal council. "Though his neck were as thick as the neck of a bull it should not save his head," raged the king, and he kept his word. Such is the story, not altogether authenticated, which has furnished a favourite theme to dramatist and novelist Samsoe the Danish poet, published his well-known tragedy "Dyveke" in the close of the 18th century, and it was translated by Manthey into German in 1798. Munch treated the subject in a semi-historical manner in his Biograph-historie Studien, Hermann Marggraf's tragedy of Dua Tausenden von Amsterdams appeared in 1835, Rokhoff's Dieweke in 1842, Hauch's Waldemar Zabern in 1834, Ede Frenck's Sybrich Williams in 1843, and Moseenthal's Dyveke in 1860.

DZUNGARIA, Dzongaria, or Songaria, a former Mongolian kingdom of Central Asia, raised to its highest pitch by Kaldan or Bushtu Khan in the latter half of the 17th century, but completely destroyed by Chinese invasion about 1757-59. It derived its name from the Dongsars, or Songars, who were so called because they formed the left wing (dun, left, parr, hand) of the Mongolian army. Its widest limits included Kashgar, Yarkand, Khotan, the whole region of the Thun Shan Mountains, and in short the greater proportion of that part of Central Asia which extends from 35° to 50° N. lat. and from 72° to 97° E. long. The name, however, is more properly applied only to the present Chinese province of Thun-Shan-pelu and the country watered by the Il. As a political or geographical term it has practically disappeared from the map; but the range of mountains stretching north-east along the southern frontier of the Land of the Seven Streams—as the district to the south-east of the Balkhash Lake is called—preserves the name of the Dzungarian Ranges.
E

E is the second vowel-symbol and the fifth letter in our alphabet. In its original form among the Phoenicians it represented the rough breathing—our k; we have seen that A represented the smooth breathing. As the Greeks had the sound Α at a very early period, it might have been expected that this symbol would have been taken by them with its original value. But the want of symbols to denote the vowels was apparently felt to be more imperative, therefore all the Phoenician symbols (corresponding to the Hebrew aleph, he, ayin) were taken to denote the vowel-sounds a, e, o respectively. The form of the symbol E has varied little from the earliest Greek times to our own. In old Latin it is sometimes, but rarely, found in the form Æ. The typical sound of E in almost all languages is one of those which we denote generally by a in English, e.g., in the word fate—that is, one of the simple sounds between A (English a) and I (English e), which are produced by raising the tongue gradually from its lowest position (at A) to its highest position (at I); in this scale of sounds the lips are not employed. The most clearly distinguished of these sounds are (1) that in men, (2) that in fair, (3) that in fate. It will be observed that these sounds have here different symbols; and if these were consistently employed in English we should not have much reason to complain of our spelling; but e also has the long sound in here and see; as in well has the same sound as a in fate, and it has many sounds. Other languages employ diacritical marks to distinguish these sounds; thus in Italian we have é and à called "open" and "close" e respectively; these correspond very nearly to (2) and (3) mentioned above. It is probable that the same distinction of sound was given in Latin by employing ae to express the open e, and a to express the close e. E was commonly found in Italian words which were written in Latin with ae, or with e short. It is possible that in Greece a similar distinction of close open e was expressed in early times by the symbols ε (epsilon) and η (eta); but in Attica, at least after 403 B.C., the distinction seems to have been rather quantitative than qualitative. For the history of eta see article Η. It is clear that in a perfect alphabet we ought to have at least three distinct symbols between A and I: we ought not to be compelled to distinguish the simple sounds by diphthongs or other modifications. Indeed yet more symbols would be desirable, for there are other sounds in this scale, which, however, are not easily distinguished from the above except by a practised ear.

It is probable that ae in English of the 16th and 17th centuries had the sound still heard in Scotland in words like stil, i.e., the simple e in our men pronounced long: this is not the only open e, but the back of the tongue is lower. But ae had acquired its present I sound in the last century.

EACHARD, JOHN (1636–1697), an English divine, was born in Suffolk in 1636, and was educated at Catherine Hall, Cambridge, of which he became master in 1675 in succession to Lightfoot. He was created a doctor of divinity in 1676 by royal mandate, and was twice (in 1679 and 1685) vice-chancellor of the university. He died on the 7th July 1697. In 1670 he had published anonymously a humorous satire entitled The Ground and Occasions of the Contempt of the Clergy enquired into in a letter to R. L., which excited much attention and provoked several replies, one of them being from John Owen. These were met by Some Observations, etc., in a second letter to R. L. (1671), written in the same bantering tone as the original work. Eachard attributed the contempt into which the clergy had fallen to their imperfect education, their insufficient incomes, and the want of a true vocation. He gave amusing illustrations of the absurdity and poverty of the current pulpiter oratory of his day, some of them being taken from the sermons of his own father. He attacked the philosophy of Hobbes in his Mr Hobbs's State of Nature considered; or a dialogue between Philantus and Timothy (1672), and in his Some Opinions of Mr Hobbs considered in a second dialogue (1673). They were written in their author's chosen vein of light satire, and Dryden praised them as highly effective within their own range. It is noteworthy that Eachard's own sermons were not superior to those he satirized. Swift alludes to him as a signal instance of a successful humorist who entirely failed as a serious writer. A collected edition of his works in three volumes, with a notice of his life, was published in 1774.

EADIE, JOHN (1810–1876), theologian and biblical critic, was born at Alva, in Stirlingshire, on the 9th May 1810. Having manifested unusual ability at school, he was sent to the university of Glasgow, where he passed through the usual curriculum in arts. Immediately afterwards he commenced to study for the ministry at the Divinity Hall of the Secession Church, a dissenting body which, on its union a few years later with the Relief Church, adopted the denomination United Presbyterian. In 1835 he was ordained to the pastoral charge of the Cambridge Street Secession church in Glasgow. Here he speedily attained a position of great eminence and usefulness, and for many years before the close of his life he was generally regarded as the leading representative of his denomination in the city which has always been its stronghold. Though he had little claim to be called eloquent, and his style was often slovenly, he had many of the other qualities that secure the most useful and enduring kind of popularity. As a preacher he was distinguished by invariable good sense, frequent flashes of happy illustration, masculine piety, deep spiritual earnestness, breadth of sympathy both intellectual and emotional, and—most specifically of all—by the power he had in his expository discourses of conveying the best results of biblical criticism in an intelligible form to a general audience. Behind the carelessness and apparent indifference of his manner, it was not difficult to detect the quick sensibility and tender feeling which were eminently characteristic of the man. Though more than once invited to an important charge elsewhere, Dr Eadie refused to leave Glasgow, in which he found a sphere more exactly suited to his pastoral gifts than he could expect in any other place. In 1863 he removed with a portion of his congregation to a new and beautiful church at Laurieston Crescent, where his influence continued unabated until his death.

From his student days Eadie bore a reputation for extensive, if not profound and accurate, scholarship, which he justified and increased during the earlier years of his ministry to such an extent that in 1843 the church to which he belonged appointed him professor of biblical literature and hermeneutics in its Divinity Hall. He held this appointment along with his ministerial charge till the close of his life, and discharged its duties with an efficiency that was universally acknowledged. While his scholarship was not minute or thorough, it was sure and sound, and was surmounted by few but notable commentators of his day in range of learning, and by still fewer in the soundness of judgment with which his learning was applied. As a critic he was acute and painstaking;
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as an interpreter he was eminently fair-minded. In the professor's chair, as in the pulpit, his strength lay in the tact with which he selected the soundest results of biblical criticism, whether his own or that of others, and presented them in a clear and connected form, with a constant view to their practical bearing. If his works were not of an academic aspect to some portions of his lectures, he rendered them not less interesting and probably not less useful to his auditors. Eadie's merits as a scholar were early acknowledged by the usual honorary university distinctions. He received the degree of L.L.D. from Glasgow in 1844, and that of D.D. from St Andrews in 1850.

Busily engaged as he was in two distinct offices, either of which might well of itself have employed all his energies, Eadie nevertheless found time for an amount of work in a third sphere, of which the same thing might be said. His labours as an author would have been more than credible to one who had no other occupation. Most of his works were connected with biblical criticism and interpretation, some of them being designed for popular use and others being more strictly scientific. To the former class belong the Biblical Cyclopaedia, his edition of Gravett's Concurrence, his Early Oriental History, and his discourses on The Divine Law and on Paul the Preacher, to the latter belong his commentaries on the Greek text of St Paul's epistles to the Ephesians, Colossians, Philippians, and Galatians, published at intervals in four volumes, which take a high rank among exegetical works. His Life of Dr Kito obtained a deserved popularity. His last work, the History of the English Bible (2 vols. 1876), will probably be the most enduring memorial of his ability as an author. Though not unimportant in point of arrangement and style, it contains a fuller and more accurate account of the subject than is to be found anywhere else, and almost every page bears marks of the life-long interest and loving research of the author. His most unrivalled knowledge of the various English versions, as well as his ability as a critic and interpreter of the original, led to his being selected as one of the company for the revision of the authorized version of the New Testament, and in this capacity it is understood that he rendered excellent service. Dr Eadie died at Glasgow on the 3d June 1876.

EADMER, or EDEMER (in Latin Eadmerus, and by mistake Edinurus and Edinurus), an English ecclesiastic and historian of the Norman period, probably, as his name suggests, of English as opposed to Norman parentage. At an early age he was sent to the Benedictine monastery at Canterbury; and there he became acquainted with Anselm, at the time of the latter's first visit to England as abbot of Bec. The intimacy was renewed when Anselm was raised to the episcopal see; and thenceforward Eadmer was not so much the archbishop's disciple and follower as his friend and director, and that at last not only by Anselm's private recognition, but by the formal appointment of Pope Urban II. So complete, indeed, was the obedience shown by the great scholastic philosopher and head of the English Church to his self-elected tutor, that—according to William of Malmesbury, De gestis pontificum Anglorum, lib. I.—he is said to have waited for his express permission before he rose from his bed, or even turned from one side to the other. After Anselm's death Eadmer accompanied Radulph, the new archbishop, to Rome in 1119; and on their return in 1120 he was nominated to the see of St Andrews in Scotland. Owing, however, to the refusal of Anselm to recognise the claims put forward by Eadmer and his patron in support of the episcopal authority of the see of Canterbury, he was never formally inducted into the office. He was at Canterbury in 1121, and he spent the latter part of his life as prior of the monastery there. His death is variously assigned to the year 1128 and 1137.

Eadmer has left a large number of works, of which a list is given in Wharton's Anglo-Saxon, part II. Most important is his Historia Novembarum, in six books treating of his own time down to the death of Ralph in 1122, and his Pan De Portale in 1124, and both have since been several times reprinted. Of less mark are his lives of Odo, Bregewin, and Dunstan, and of Oswald and Wilfred of York, and his treatises—formerly ascribed to Anselm—De quattuor veritatis et quatuor de beata Maria Virgine, and De Simultudiinbus S. Anselmi. Nearly all his works are to be found in an early MS in the library of Corpus Christi College, Cambridge (C C C C, No. 371), and most of them have been reprinted as an appendix to Anselm's Opera by Gerberon, fol. 1674, and by the Benedictine monks of St Maur, ed. Paris, 1721. A number of his letters are preserved in MSS Cotton, Otho. A. 14.

EAGLE (French Aigle; from the Latin Aquila), the name generally given to the larger Diurnal Birds of prey which are not Vultures, but the limits of the subfamily Aquilinae have been very variously assigned by different writers on systematic ornithology, and, as before observed (Buckland, vol. iv. p. 603), there are Eagles smaller than some Buzzards. By some authorities the femmeres and buzzards, which the common English name (Bearded Vulture) shows. There are also other forms, such as the genera Aquila, Circus, Selenis, and allies, which though generally called Eagles have been ranked as Buzzards. In the absence of any truly scientific definition of the family Aquilinae it is best to leave this and many other more or less questionable members of the group—such as the genera Spilornis, Ciconius, Scelogus, Heterurus, and so forth—and, so far as space will allow, to treat here of those whose position cannot be gainsaid.

True Eagles inhabit all the regions of the world, and some seven or eight species at least are found in Europe, of which two are resident in the British Islands. In England and in the Lowlands of Scotland Eagles only exist as stragglers; but in the Hebrides and some parts of the Highlands a good many may yet be found, and their numbers appear to have rather increased of late years than diminished, for the foresters and shepherds, finding that a high price can be got for their eggs, take care to protect the owners of the eyries, which are nearly all well known, and to keep up the stock by allowing them to rear their young. There are also now not a few occupiers of Scottish forests who interfere so far as they can to protect the king of birds. But his mountainous country is not to young, poisoning, and other destructive devices were resorted to without stint, and there was then every probability that before long not an Eagle would be left to add the wild majesty of its appearance to the associations of the mountain or the lake. In Ireland the extermination of Eagles seems to have been carried on almost unashamedly by the prudent considerations which in the northern kingdom have operated so favourably for the race, and except in the wildest parts of Donegal, Mayo, and Kerry, Eagles in the sister-island are said to be almost birds of the past.

Of the two British species the Erne (Hali, Erna) or Sea-
Eagle (by some called also the White-tailed and Chineyous Eagle)—*Haliaetus albullla*—affects chiefly the coast and neighbourhood of inland waters, living in great part on the fish and refuse that is thrown up on the shore, though it not unfrequently takes living prey, such as lambs, hares, and rabbits. On these last, indeed, young examples mostly feed when they wander southward in autumn, as they yearly do, and appear in England. The adults (fig. 1) are distinguished by their prevalent greyish-brown colour, their pale head, yellow neck, and white tail—characters, however, wanting in the immature, which do not assume the perfect plumage for some three or four years. The eyry is commonly placed in a high cliff or on an island in a lake—sometimes on the ground, at others in a tree—and consists of a vast mass of sticks, in the midst of which is formed a hollow lined with *Lasiula sphyraena* (as first observed by the late Mr John Wolley) or some similar grass, and here are laid the two or three white eggs. In former days the Sea-Eagle seems to have bred in several parts of England—as the Lake district, and possibly even in the Isle of Wight and on Dartmoor. This species inhabits all the northern part of the Old World from Iceland to Kamchatka, and breeds in Europe so far to the southward as Albania. In the New World, however, it is only found in Greenland, being elsewhere replaced by the White-headed or Bald Eagle, *H. leucocephalus*, a bird of similar habits, and the chosen emblem of the United States of America. In the far east of Asia occurs a still larger and finer Sea-Eagle, *H. pelagius*, remarkable for its white thighs and upper wing-ovets. South-eastern Europe and India furnish a much smaller species, *H. leucoryphus*, which has its representative, *H. leucogaster*, in the Malay Archipelago and Australia, and, as allies in South Africa and Madagascar, *H. vocifer* and *H. vociferoides* respectively. All these Eagles may be distinguished by their soapy tarsi, while the group next to be treated of have the tars feathered to the toes.

The Golden or Mountain-Eagle, *Aquila chrysaetos*, is the second British species. This also formerly inhabited England, and a nest, found in 1568 in the Peak of Derbyshire, is well described by Willoughby, in whose time it was said to breed also in the Snowdon range. It seldom if ever frequents the coast, and is more active on the wing than the Sea-Eagle, being able to take some birds as they fly, but a large part of its sustenance is the flesh of animals that dis a natural death. Its eyry is generally placed and built like that of the other British species, but the neighbourhood of water is not requisite. The eggs, from two to four in number, vary from a pure white to a mottled, and often highly-coloured, surface, on which appear different shades of red and purple. The adult bird (fig. 2) is of a rich, dark brown, with the elongated feathers of the neck, especially on the nape, light tawny, in which imagination sees a "golden" hue, and the tail marbled with brown and ashy-grey. In the young the tail is white at the base, and the neck has scarcely any tawny tint. The Golden Eagle does not occur in Iceland, but occupies suitable situations over the rest of the Palaearctic Region and a considerable portion of the Neotropical—though the American bird has been, by some, considered a distinct species. Domesticated, it has many times been trained to take prey for its master in Europe, and to this species is thought to belong an Eagle habitually used by the Kurgis Tartars, who call it *Bergut* or *Bearroot*, for the capture of antelopes, foxes, and wolves. It is carried hooded on horseback or on a perch between two men, and released when the quarry is in sight. Such a bird, when well trained, is valued, says Pallas, at the price of two camels. It is quite possible, however, that more than one kind of Eagle is thus used, and the services of *A. lathaca* (which is the Imperial Eagle of some writers) and of *A. mogulina*—

1 As already stated, the site chosen varies greatly. Occasionally placed in a niche in what passes for a perpendicular cliff to which ascent could only be gained by a skillful eagarman with a rope, the writer has known a nest to within ten or fifteen yards of which he rode on a pony. Two beautiful views of as many Golden Eagle's nests, drawn on the spot by Mr Wolf, are given in the Oudbera Hallets, and a fine series of eggs is also figured in the same work.

2 Which species may have been the traditional emblem of Roman power, and the Aes Socala, is very uncertain.
both of which are found in Central Asia, as well as in South-eastern Europe—may also be employed.

Of the other more or less nearly allied species or races want of room forbids the consideration, but there is a smaller form on which a few words may be said. This has usually gone under the name of A. semipalmata, but is now thought by the best authorities to include three local races, or, in the eyes of some, species. They inhabit Europe, North Africa, and Western Asia to India, and two examples of one of them—A. bangs, the form which is somewhat plentiful in North-eastern Germany—have occurred in Cornwall. The smallest true Eagle is A. pennata, which inhabits Southern Europe, Africa, and India. Differing from other Eagles of their genus by its wedge-shaped tail, though otherwise greatly resembling them, is the A. audax of Australia. Lastly may be noticed here a small group of Eagles, characterized by their long legs, forming the genus Accipiter, of which one species, N. fasciatus, is found in Europe. The Osprey (Pandion), though placed by many among the Aquilina, certainly does not belong to that subfamily (A. N.).

The simplest form of the organ of hearing is a small sac containing fluid, with the auditory nerve expanded upon it. Sonorous vibrations are communicated to this sac either directly through the hard parts of the head, or at the same time by a membrane exposed to the surrounding medium. Such is the form of ear found in many of the Crustacea and in the Cephalopoda. In the Vertebrata, there is a progressive development and increasing complexity from the fishes up to Mammalia. For details as to the structure of the ear in the different subdivisions of the Vertebrata, reference is made to the articles treating of these, such as Amphibia, Birds, &c., and the structure of the human ear will be found fully described in the article Anatomy, vol. i. p. 891. It is the object of this article to describe the phenomena of auditory sensation from the physiological point of view.

The sense of hearing is a special sensation the cause of which is an excitation of the auditory nerves by the vibrations of sonorous bodies. A description of sonorous vibrations and of their transmission is given in the article Acoustics; here we shall consider, first, the transmission of such vibrations from the external ear to the auditory nerve, and secondly, the physiological characters of auditory sensation.

1. Transmission in External Ear.—The external ear consists of the pinna, or auricle, and the external auditory meatus, or canal, at the bottom of which we find the membrana tympani, or drum head. In many animals the auricle is trumpet-shaped, and, being freely movable by muscles, serves to collect sonorous waves coming from various directions. The auricle of the human ear presents many irregularities of surface. If these irregularities are abolished by filling them up with a soft material such as wax or oil, leaving the entrance to the canal free, experiment shows that the intensity of sounds is weakened, and that there is more difficulty in judging of their direction. When waves of sound strike the auricle, they are partly reflected outward, while the remainder, impinging at various angles, undergo a number of reflections so as to be directed into the auditory canal. Vibrations are transmitted along the auditory canal, partly by the air it contains and partly by its walls, to the membrana tympani. The absence of the auricle, as the result of accident or injury, has not caused diminution of hearing. In the auditory canal, waves of sound are reflected from side to side until they reach the membrana tympani. From the obliquity in position and peculiar curvature of this membrane, most of the waves must strike it nearly perpendicularly, and in the most advantageous direction.

2. Transmission in Middle Ear.—The middle ear is a small cavity, the walls of which are rigid with the exception of the portions consisting of the membrana tympani, and the membrane of the round window and of the apparatus filling the oval window. This cavity communicates with the pharynx by the Eustachian tube, which forms a kind of air-tube between the pharynx and the tympanum for the purpose of regulating pressure on the membrana tympani. It is generally supposed that during rest the tube is open, and that it is closed during the act of deglutition. As this action is frequently taking place, not only when food or drink is introduced, but when saliva is swallowed, it is evident that the pressure of the air in the tympanum will be kept in a state of equilibrium with that of the external air on the outer surface of the membrana tympani, and that thus the membrana tympani will be rendered independent of variations of atmospheric pressure such as may occur within certain limits, as when we descend in a diving bell or ascend in a balloon. By a forcible expiration, the oral and nasal cavities being closed, air may be driven into the tympanum, while a forcible inspiration (Valsalva's experiment) will draw air from that cavity. In the first case, the membrana tympani will bulge outwards, in the second case inwards, and in both, from excessive stretching of the membrane, there will be partial deafness, especially for sounds of high pitch. Permanent occlusion of the tube is one of the most common causes of deafness.

The membrana tympani is capable of being set into vibration by a sound of any pitch included in the range of perceptible sounds. It responds exactly as to number of vibrations (pitch), intensity of vibrations (intensity), and complexity of vibration (quality or timbre). Consequently we can hear a sound of any given pitch, of a certain intensity, and in its own specific timbre or quality. Generally speaking, very high tones are heard more easily than low tones of the same intensity. As the membrana tympani is not only fixed by its margin to a ring or tube of bone, but is also adherent to the handle of the malleus, which follows its movements, its vibrations meet with considerable resistance. This diminishes the intensity of its vibrations, and prevents also the continued vibration of the membrane after an external vibration has ceased, so that a sound is not heard much longer than it lasts. The tension of the membrane may be affected (1) by differences of pressure on the two surfaces of the membrana tympani, as may occur during forcible expiration or inspiration, or in a pathological condition, ant(2) by muscular action through the contraction of the tensor tympani muscle. This small muscle arises from the apex of the petrous temporal and the cartilage of the Eustachian tube, enters the tympanum at its anterior wall, and is inserted into the malleus near its root. The handle of the malleus is inserted between the layers of the membrana tympani, and, as the malleus and incus move round an axis passing through the neck of the malleus from before backwards, the action of the muscle is to pull the membrana tympani inwards towards the tympanic cavity in the form of a cone, the meridians of which, according to Helmholz, are not straight but curved, with convexity outwards. When the muscle contracts, the handle of the malleus is drawn still further inwards, and thus a greater tension of the tympanic membrane is produced. On relaxation of the muscle, the membrane returns to its position of equilibrium by its own elasticity and by the elasticity of the chain of bones. This power of varying the tension of the membrane is a kind of accommodating mechanism for receiving and transmitting sounds of different pitch. With different degrees of tension, it will respond more readily to sounds of different pitch. When the membrane is tense, it will readily respond to high sounds, while relaxation will be the condition most
adapted for low sounds. In addition, increased tension of the membrane, by increasing the resistance, will diminish the intensity of vibrations. This is especially the case for sounds of low pitch.

Heimholtz has also pointed out that the peculiar form of the membrana tympani in man has the effect of increasing the force of its vibrations at the expense of their amplitude. The vibrations of the membrana tympani are transmitted to the internal ear partly by the air which the middle ear or tympanic cavity contains, and partly by the chain of bones, consisting of the malleus, incus, and stapes. Of these, transmission by the chain of bones is by far the most important. In birds and in the scaly amphibians, this chain is represented by a single rod-like ossicle, the columella, but in man the two membranes—the membrana tympani and the membrane filling the fenestra ovalis—are connected by a compound lever consisting of three bones, namely, the malleus, or hammer, inserted into the membrana tympani, the incus, or anvil, and the stapes, or stirrup, the base of which fits into the oval window. The lever thus formed has its fulcrum near the short process of the incus, which abuts against the tympanic wall; the power is applied at the handle of the malleus, and the resistance is at the base of the stirrup. Both by direct experimental observation and by calculation from data supplied by measurement of the lengths of the arms of the lever, Heimholtz has shown that by this arrangement vibrations are diminished in extent in the ratio of 3 to 2, but are inversely increased in force. Considering the great resistance offered to excursions of the stapes, such an arrangement must be advantageous. It must also be noted that in the transmission of vibrations of the membrana tympani to the fluid in the labyrinth it contains, and partly through the chain of bones, the chain of ossicles vibrates as a whole and acts efficiently, the fluid of the labyrinth may receive vibrations of the fluid in the labyrinth by three different ways: (1) From the osseous walls of the labyrinth, (2) by the air in the tympanum and the round window, and (3) by the base of the stapes inserted into the oval window.

When the head is plunged into water, or brought into direct contact with any vibrating body, vibrations must be transmitted directly. Vibrations of the air in the mouth and in the nasal passages are also communicated directly to the walls of the cranium, and thus pass to the labyrinth. In like manner, we may experience peculiar auditory sensations, such as blowing, rubbing, and hissing sounds, due to muscular contraction or to the passage of blood in vessels close to the auditory organ. It has not been satisfactorily made out to what extent, if any, vibrations may be communicated to the fluid in the labyrinth by the round window. There can be no doubt, however, that in ordinary hearing vibrations are communicated chiefly by the chain of bones. When the base of the stirrup is pushed into the oval window, the pressure in the labyrinth increases, the impulse passes along the scala vestibuli to the scala tympani, and, as the only mobile part of the wall of the labyrinth is the membrane covering the round window, this membrane is forced outwards; when the base of the stirrup is pulled outwards, the pressure in the labyrinth decreases, the impulse passes along the scala tympani to the scala vestibuli. Thus the fluid of the labyrinth may receive a series of pulses or vibrations isochronous with the movements of the base of the stirrup, and these pulses affect the terminal apparatus in connection with the auditory nerve.

Since the size of the membranous labyrinth is so small, measuring, in man, not more than ½ inch in length by ¼ inch in diameter at its widest part, and since it is a chamber consisting partly of conduits of very irregular form, it is impossible to state accurately the course of vibrations transmitted to it by impulses communicated from the base of the stirrup. In the cochlea, vibrations must pass from the scala vestibuli along the scala vestibuli to the scala tympani and, in certain parts of which we find the terminal apparatus in connection with the auditory nerve, immersed in another fluid called the endolymph. The membranous labyrinth consists of a vestibular portion formed by two small sac-like dilatations, the scala vestibuli and the scala tympani, the latter of which communicates with the semicircular canals by five openings. Each canal consists of a tube, bulging out at each extremity so as to form the so-called ampulla, in which, on a projecting ridge, called the crista acustica, there are cells bearing or developed into long auditory hairs, which are to be regarded as the peripheral end-organs of the vestibular branches of the auditory nerve. The cochlear division of the membranous labyrinth consists of the ductus cochlearis, a tube of triangular form fitting in between the two cavities in the cochlea, called the scala vestibuli; because it commences in the vestibule, and the scala tympani, because it ends in the tympanum, at the round window. These two scala communicate at the apex of the cochlea. The roof of the ductus cochlearis is formed by a thin membrane called the membrane of Reissner, while its floor consists of the basilar membrane, on which we find the remarkable organ of Corti, which constitutes the terminal organ of the cochlear division of the auditory nerve, and which is fully described in vol. i. p. 894. It is sufficient to state here that this organ consists essentially of an arrangement of epithelial cells bearing hairs which are in communication with the terminal filaments of the spiral of the auditory nerve, and that groups of these hairs pass through holes in a closely investing membrane, the organ of Corti, which is supposed to act as a dampening apparatus, so as quickly to stop their movements. The ductus cochlearis and the two scalae are filled with fluid. Sonorous vibrations may reach the fluid in the labyrinth by three different ways: (1) From the osseous walls of the labyrinth, (2) by the air in the tympanum and the round window, and (3) by the base of the stapes inserted into the oval window.

The intensity of the vibrations of the air is determined by the elasticity of the middle ear, and by calculation from data supplied by measurement of the lengths of the arms of the lever, Heimholtz has shown that by this arrangement vibrations are diminished in extent in the ratio of 3 to 2, but are inversely increased in force. Considering the great resistance offered to excursions of the stapes, such an arrangement must be advantageous. It must also be noted that in the transmission of vibrations of the membrana tympani to the fluid in the labyrinth it contains, and partly through the chain of bones, the chain of ossicles vibrates as a whole and acts efficiently, although its length may be only a small fraction of the wave length of the sound transmitted.

3. Transmission in the Internal Ear.—The internal ear is composed of the labyrinth, formed of the vestibule or central part, the semicircular canals, and the cochlea, each of which consists of an osseous and a membranous portion (see vol. i. p. 893). The osseous labyrinth may be regarded as an osseous mould in the petrous portion of the temporal bone, lined by tasselled endothelium, and containing a small quantity of fluid called the perilymph. In this mould, partially surrounded by, and to some extent floating in, this fluid, there is the membranous labyrinth, consisting of parts of which we find the terminal apparatus in connection with the auditory nerve, immersed in another fluid called the endolymph. The membranous labyrinth consists of a vestibular portion formed by two small sac-like dilatations, the scala vestibuli and the scala tympani, the latter of which communicates with the semicircular canals by five openings. Each canal consists of a tube, bulging out at each extremity so as to form the so-called ampulla, in which, on a projecting ridge, called the crista acustica, there are cells bearing or developed into long auditory hairs, which are to be regarded as the peripheral end-organs of the vestibular branches of the auditory nerve. The cochlear division of the membranous labyrinth consists of the ductus cochlearis, a tube of triangular form fitting in between the two cavities in the cochlea, called the scala vestibuli; because it commences in the vestibule, and the scala tympani, because it ends in the tympanum, at the round window. These two scala communicate at the apex of the cochlea. The roof of the ductus cochlearis is formed by a thin membrane called the membrane of Reissner, while its floor consists of the basilar membrane, on which we find the remarkable organ of Corti, which constitutes the terminal organ of the cochlear division of the auditory nerve.
In the next place, vibrations must have a certain duration to be perceived; and lastly, to excite a sensation of a continuous musical sound, a certain number of vibrations must occur in a given interval of time. The lower limit is about 30, and the upper about 30,000 vibrations per second. Below 30, the individual impulses may be observed, and above 30,000 few ears can detect any sound at all. The extreme upper limit is not more than 35,000 vibrations per second. Auditory sensations are of two kinds—noises and musical sounds. Noises are caused by impulses which are not regular in intensity or duration, and are not periodic, or they may be caused by a series of musical sounds occurring instantly as so as to produce discord, as when we place our hand at random on the key-board of a piano. Musical tones are produced by periodic and regular vibrations. In musical sounds three characters are prominent—intensity, pitch, and quality. Intensity depends on the amplitude of the vibration, and a greater or lesser amplitude of the vibration will cause a corresponding movement of the transmitting apparatus, and a corresponding intensity of excitation of the terminal apparatus. Pitch, as a sensation, depends on the length of time in which a single vibration is executed, or, in other words, the number of vibrations in a given interval of time. The ear is capable of appreciating the relative pitch or height of a sound as compared with another, although it may not ascertain precisely the absolute height of a sound. What we call an acute or high tone is produced by a large number of vibrations, while a grave or low tone is caused by few. The musical tones which can be used with advantage range between 40 and 4000 vibrations per second, extending them from 6 to 7 octaves. According to E. H. Weber, practiced musicians can perceive a difference of pitch amounting even to only the 1/10 of a semitone, but this is far beyond average attainment. Quality or timbre (or Klang) is that peculiary characteristic of a musical sound by which we may identify it as proceeding from a particular instrument or from a particular human voice. It depends on the fact that many waves of sound that reach the ear are really compound wave systems, built up of constituent waves, each of which is capable of exciting a sensation of a simple tone if it be unsangled out and reinforced by a resonator (see Acoustics), and which may sometimes be heard without a resonator, after special practice and tuition. Thus it appears that the ear must have some arrangement by which it receives every wave system, however complex, into simple periodic vibrations. When we listen to a sound of any quality we recognize that it is of a certain pitch. This depends on the number of vibrations of one tone, predominant in intensity over the others, called the fundamental or ground tone, or first partial tone. The quality, or timbre, depends on the number and intensity of other tones added to it. These are termed harmonics or partial tones, and they are related to the first partial or fundamental tone in a very simple manner, being multiples of the fundamental tone. Thus—

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<th>Fundamental Tone</th>
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When a simple tone, or one free from partials, is heard, it is given rise to a simple, soft, somewhat insipid sensation, as may be obtained by blowing across the mouth of an open bottle or by a tuning fork. The lower partials added to the fundamental tone give softness combined with richness, while the higher, especially if they be very high, produce a brilliant and thrilling effect, and caused by the brass instruments of an orchestra. Such being the facts, how may they be explained physiologically?

Little is yet known regarding the mode of action of the vibrations of the fluid in the labyrinth upon the terminal apparatus connected with the auditory nerve. There can be no doubt that it is a mechanical action, a true communication of impulses to delicate hair-like processes, by the movements of which the nervous filaments are irritated. In the human ear it has been established that there are about 3000 small arches formed by the rods of Corti (see Anatomy). Each arch rests on the basilar membrane, and supports rows of scales having minute hair-like processes somewhat resembling cilia. It would appear also that the filaments of the auditory nerves terminate in the basilar membrane, and possibly they may be connected with the hair-cells. At one time it was supposed by Helmholtz that these fibres of Corti were elastic and that they were tuned for particular sounds, so as to form a regular series corresponding to all the tones audible to the human ear. Thus 2800 fibres distributed over the tones of seven octaves would give 400 fibres for each octave, or nearly 33 for a semitone. Helmholtz has put forward the ingenious hypothesis that, when a pendular vibration reaches the ear, it excites by sympathetic vibration the fibre of Corti which is tuned for its proper number of vibrations. If, then, different fibres are tuned to tones of different pitch, it is evident that we have here a mechanism which, by exciting different nerves, gives rise to sensations of pitch. When the vibration is not simple but compound, in consequence of the blending of vibrations corresponding to various harmonics or partial tones, the ear has the power of resolving this compound vibration into its elements. It can only do so by different fibres responding to the constituent vibrations of the sound, one for the fundamental tone being stronger, and giving the sensation of a particular pitch or height to the sound, and the others, corresponding to the upper partial tones, being weaker, and causing special though undefined sensations, which are so blended together in consciousness as to terminate in a complex sensation of a tone of a certain quality or timbre. It would appear at first sight that 33 fibres of Corti for a semitone are not sufficient to enable us to detect all the gradations of pitch in that interval, since, as has been shown above, trained musicians may distinguish a difference of 1/10 of a semitone. To meet this difficulty, Helmholtz states that if a sound is produced, the pitch of which may be supposed to come between two adjacent fibres of Corti, both of these will be set into sympathetic vibration, but the one which comes nearest to the pitch of the sound will vibrate with greater intensity than the other, and that consequently the pitch of that sound would be thus appreciated. These theoretical views of Helmholtz have derived much support from remarkable experiments of Hensen, who observed that certain hairs on the antenna of Myia, a Crucifer, when observed with a low microscope power, vibrated with certain tones produced by a key. It was seen that certain tones of the horn set some hairs into strong vibration, and other tones other hairs. Each hair responded also to several tones of the horn. Thus one hair responded strongly to do and do², more weakly to g, and very weakly to a. It was probably tuned to some pitch between do² and do³. (Studien über das Gehörorgan der Decapoden, Leipzig, 1863.)

Recent histological researches have led to a modification of this hypothesis. It has been found that the rods or arches of Corti are stiff structures, not adapted for vibrating, but apparently consisting of a kind of support for the hair cells. It is also known that there are no rods of Corti in the cochlea of birds, which are capable of producing pitch. Hensen and Helmholtz have now suggested the view that not only may the segments of the membrana basilaris be stretched more in the radial than
in the longitudinal direction, but different segments may be stretched radially with different degrees of tension so as to resemble a series of tense strings of gradually increasing length. Each string would then respond to a vibration of a particular pitch communicated to it by the hair-cells. The exact mechanism of the hair-cells and of the membrana reticulata, which looks like a damping apparatus, is unknown.

II. Physiological Characters of Auditory Sensation. — 1. Under ordinary circumstances auditory sensations are referred to the outer world. When we hear a sound, we associate it with some external cause, and it appears to originate in a particular place, or to come in a particular direction. This feeling of exteriority of sound seems to require transmission through the membranes tympani. Sounds which are sent through the walls of the cranium, as when the head is immersed in water, appear to originate in the body itself. It is probable, however, that the external character of ordinary auditory sensations may be more the result of habit than due to any anatomical peculiarity of the ear itself.

2. An auditory sensation lasts a short time after the cessation of the exciting cause, so that a number of separate vibrations, each capable of exciting a distinct sensation when heard alone, may succeed each other so rapidly that they are fused into a single sensation. If we listen to the puffs of a syren, or to vibrating tongues of low pitch, the single sensation is usually produced by about 30 or 32 vibrations per second; but there can be no doubt, as was first pointed out by Helmholtz, that when we listen to beats of considerable intensity, produced by two adjacent tones of sufficiently high pitch, the ear may follow as many as 132 intermissions per second.

3. The sensibility of the ear for sounds of different pitch is not the same. It is more sensitive for acute than for grave sounds, and it is probable that the maximum degree of acuteness is for sounds produced by about 3000 vibrations per second, that is near 425. Sensibility as to pitch varies much with the individual and with the training to which he has subjected himself. Thus some musicians may detect a difference of \( \frac{1}{1000} \) of the total number of vibrations, whereas other persons may have difficulty in appreciating a semitone. This power of appreciating differences of pitch is termed a correct or just ear, and there can be no doubt of its improvement by cultivation.

4. Hearing with two ears does not appear materially to influence auditory sensation, but probably the two organs are enabled, not only to correct each other’s errors, but also to aid us in determining the locality from whence a sound originates. It is asserted by Fechner that one ear may perceive the same tone at a slightly higher pitch than the other, but this may probably be due to some slight pathological condition in one ear. If two tones, produced by two tuning forks of equal pitch, are produced one near each ear, there is a uniform single sensation; if one of the tuning forks be made to revolve round its axis in such a way that its tone increases and diminishes in intensity, neither fork is heard continuously, but both sound alternately, the fixed one being only audible when the revolving one is not. It is difficult to decide whether exactitude of corresponding elements in the two ears can be distinguished from each other. It is probable that the resulting sensations may be distinguished, provided one of the generating elements differs from the other in intensity or quality, although it may be the same in pitch.

5. Hitherto we have considered only the audition of a single sound, but it is possible also to have simultaneous auditive sensations, as in musical harmony. It is difficult to ascertain what is the limit beyond which distinct auditory sensations may be perceived. We have in listening to an orchestra a multiplicity of sensations which produces a total effect, while, at the same time, we can with ease single out and notice attentively the tones of one or two special instruments. Thus the pleasure of music may arise partly from listening to simultaneous, and partly from the effect of contrast or suggestion in passing through successive, auditory sensations.

The principles of harmony belong to the subject of music, but it is necessary here briefly to refer to them from the physiological point of view. If two musical sounds reach the ear at the same moment, an agreeable or disagreeable sensation is experienced, which may be termed a concord or a discord, and it can be shown by experiment with the syren (see Acoustics) that this depends upon the vibratory numbers of the two tones. The octave (1 2), the twelfth (1 3), and double octave (1 4), are absolutely consonant sounds; the fifth (2 3) is said to be perfectly consonant; and then follow, in the direction of dissonance, the fourth (3 4), major sixth (3 5), major third (4 5), minor sixth (5 8), and the minor third (9 5). Helmholtz has attempted to account for this by the application of his theory of beats.

Beats are observed when two sounds of nearly the same pitch are produced together, and the number of beats per second is equal to the difference of the number of vibrations of the two sounds. Beats give rise to a peculiarly disagreeable intermittent sensation, comparable to what is experienced on watching a flickering light, and a painful sensation may arise from intermittent vibrations of the auditory nerve filaments. The maximum roughness of beats, according to Helmholtz, is attained by 33 per second; beyond 132 per second, the individual impulses become indistinguishable as auditory sensation. When two notes are sounded, say on a piano, not only may the first, fundamental, or prime tones beat, but partial tones of each of the pmures may beat also, and the difference of pitch of two simultaneous sounds augments, the number of beats, both of prime tones and of harmonics, augments also. The physiological effect of beats, though they may not be immediately appreciable, is to give roughness to the ear. If harmonics or partial tones of prime tones coincide, there are no beats; if they do not coincide, the beats produced will give a character of roughness to the interval. Thus in the octave and twelfth, all the partial tones of the acute sound coincide with the partial tones of the grave sound, and the fourth, major sixth, and major third, only two pairs of the partial tones coincide, while in the minor sixth, minor third, and minor seventh, only one pair of the harmonics coincide. For details, see Helmholtz, On Sensations of Tone as a Physiological Basis for the Theory of Music, translated by Alexander J. Ellis, London, 1875.

DISEASES OF THE EAR. — Deafness may arise from obstruction of the external ear occasioned by disease of various kinds, from ulceration, thickening, or perforation of the membranes tympani; from inflammatory affections, both acute and chronic, of the middle and internal ear; from obstruction of the Eustachian tube caused by inflammation of its lining membrane, leading to thickening and accumulation of pus or mucus; from diseases of the tympanum itself; and, lastly, from disease of the auditory nerve or of the terminal apparatus connected with it in the membraneous labyrinth. Otitis, or ear-ache, is an inflammation, usually of a rheumatic nature, of some portion of the external auditory canal. Most frequently occurring in weakly individuals, it causes intense pain, which shoots over the head on the affected side. It may lead to the formation of a small abscess in one of the wax glands found in the passage. Hot applications by fomentations or warm poultices give relief, and if an abscess forms, it ought to be carefully lanced. Otorrhoea is a muco-purulent discharge, often of a fetid odour, from the ears of scrofulous children. It frequently occurs during teething, and it may be one of the sequela of scarlet fever, or measles, or small-pox. When pus flows from the ear, it may come from the membrane lining the deeper portion of the external meatus, or from the middle ear. A hole in the membrane tympani, or portions of bone near the middle, or internal ear. The treatment, of course, varies according to the cause, but generally the discharge may be lessened in quantity, and at all events rendered less offensive, by the use of weak in-
Note: The text appears to be partially transcribed and contains inconsistencies. The context seems to be historical, discussing the earldom of a specific earl and the subsequent titles and honors associated with it.

**EARL (Latin, comes; French, comte)**, a title and rank of nobility now the third in the order of the British peerage, and, accordingly, intervening between marquis and viscount. Earl, however, was the highest title and rank of the English nobles post conquestum until the year 1337, when by Edward III, the Black Prince was created duke of Cornwall. The “earl” of England was identical with comte or comte of France; and, so long as Norman-French continued to be spoken in this country, the English “earl” were styled “counts” as well in England as on the Continent. These powerful barons represented and succeeded the Saxon thanes who were ealdormen, their own title evidently having been derived from the *rāi* of Scandinavia.

The nature of a modern earldom is readily understood, since it is a rank and dignity of nobility which, while it confers no official power or authority, is inalienable, indivisible, and descends in regular succession to all the male heirs of the body of the grantee until, on their failure, it merges in the Crown. Not so was it with either the nature or the descent of the ancient earldoms of England. The early feudal times titles independent of office did not exist. The earls, or comtes, of those days, therefore, were actual officers, each having supreme authority in his own earldom, or “county,” under the Crown, each one of them also deriving from his earldom a certain fixed revenue, the possession of which was at times an anagnorisis of his official dignity as earl, and the evidence of his lawful and recognized title to it. But an earldom has long ceased to be endowed with any official association whatever, and has become merely a title by which its owners in male succession intestate and hold the dignitv, third in rank, of a peerage. In like manner, the descent and tenure of the ancient earldoms differed in many highly important particulars from the simple succession of the modern dignity. In the course of their chequered history, we find ancient earldoms, instead of passing by a quiet and clearly defined succession from father to son, constantly depending on the rights of female inheritance; they are seen to have been obtained by many a husband *jure uxoris*; they appear to have been transferred in an arbitrary manner, or actually to have been divided between coparcenors, or to have been retained for a while by the Crown and let out to farm. At the same time, under such strange conditions as these, and amidst conflicting vicissitudes, until they finally merged in the Crown, the ancient earldoms retained their vitality. They might descend very irregularly, and become vested in successive families, but still they did not become extinct, nor were they the claims of legal inheritance wholly forgotten or superseded, and, even if for a time they had been latent, or had actually been superseded, they emerged under more favourable circumstances, and under fresh arrangements or modifications they were again recognized by the Crown. An earl is “Right Honourable,” and is styled “My Lord.” His eldest son bears his father’s “second title,” and therefore, that second title being in most cases a viscountcy, he generally is styled “Viscount,” under all circumstances, however, the eldest son of an earl takes precedence immediately after the viscounts. The younger sons of earls are “Honourable,” but all their daughters are “Ladies.” In formal documents and instruments, the sovereign, when addressing or making mention of any peer of the degree of an earl, usually designates him “trusty and well-beloved counsels,” a form of appellation first used by Henry IV, who, after his betrothal or alliance was actually related to every earl and duke in the realm. The wife of an earl is a countess, she is “Right Honourable,” and is styled “My Lady.”

The coronet of an earl has, rising from a golden circlet, eight lofty rays of gold, each of which upon its point supports a large pearl, also, between each pair of rays, at their bases, there is a golden conventional leaf, the stalks of all these leaves being connected with the rays and with each other so as to form a continuous wreath. In representations, five of the elevated rays with their pearls and four of the leaves are shown. The cap and lining of the coronet, if worn or represented, are the same as those of the ducal coronet. An earl’s coronet without cap or lining is represented in the annexed figure.

In the monumental effigies of noble personages, which yet remain from the Middle Ages, there are many highly interesting representations of the variances of coronets worn by the earls of those days and by their contemporaries, before this coronet had assumed its present fixed and definite character. Thus, early in the 15th century, effigies of an earl and countess of Arundel, at Arundel, have very rich coronets. The earl’s has a series of leaves and of clusters of rays, the latter being encircled, all of them being raised to a considerable height above the circlet, the clusters rising rather higher than the leaves. The coronet of the countess differs in having the raised clusters set alternately with single balls or pearls that are less elevated. The coronet of a countess now in all respects is the same as that of an earl. The scarlet parliamentary robe of an earl has three doublings of ermine. The duke of Norfolk, who is premier duke, as earl of Arundel, Surrey, and Norfolk, is premier earl of England, also he holds his earldom of Arundel, a feudal dignity (as it was adjudged by Lord Hardwicke) a*.

1 In his essay at Warwick, 1499, the earl of Warwick, from a place of birth that is accompanied by a series of pearls slightly raised, but without any leaves. Still later in the century, 1483, Isabel Plantagenet, countess of Essex, in her bust at Little Easton in Essex, has a series of leaves, so less than thirteen in number, that rise to a uniform slight elevation above the front of an ample coronet; and about the same time, 1487, the coronets of another earl and countess of Arundel have been heightened with an uninterrupted series of architectural conventional leaves, and once more, at Here, in Kent, the brass to Sir T. Boleyn, G., earl of Wiltshire and Ormonde, represents the maternal grandfather of Queen Elizabeth, with the insignia of the Garter, and wearing a rich coronet, the circlet of which is set with small pearls in contact, not raised, and so numerous that upwards of twenty are designated.
PARLIAMENT, the 11th of Henry VI. 1433), by the fact of its hereditary possession of Arundel Castle only. As hereditary Earl-Marshall, his Grace of Norfolk is the head of the College of Arms.

EARLE, John (1601-1665), bishop of Worcester and afterwards of Salisbury, was born at York about 1601. He completed his education at Oxford, first entering Christ Church, and taking his degree of B.A. in 1619. He afterwards passed to Merton College, and graduated M.A. in 1624. He was appointed in 1631 proctor of the university, and in 1635 he joined the committee of the House of Commons on the matter of the closet and the house of Izaak Walton's friend Dr Morley, who became afterwards Bishop of Winchester. But his sympathies with the king and the Church of England were so strong that he declined the offer. Early in 1643 he was chosen chancellor of the cathedral of Salisbury, but of this preferment he was soon after deprived. After Cromwell's great victory at Worcester, Earl went abroad, and was named clerk of the closet and chaplain to Charles II. He spent a year at Antwerp in the house of Isaac Walton's friend Dr Morley, who became afterwards bishop of Winchester. He next joined the duke of York (James II.) at Paris, returning to England at the Restoration. He was at once appointed dean of Westminster, and in 1661 was one of the commissioners for revising the liturgy. At the end of November 1662 he was consecrated bishop of Worcester, and was translated, ten months later, to the see of Salisbury. During the plague of London Bishop Earle attended the king and queen at Oxford, and there he died, November 17, 1665. Earl's chief title to remembrance is his witty and humorous work entitled Microcomography, or a Piece of the World discovered, in Essays and Characters, which throws light on the manners of the time. First printed in 1630, it became very popular, and ran through eight editions in the lifetime of the author. A new edition with notes and appendix, containing much interesting matter, by Philip Bliss, was published in 1811. The style is quaint and epigrammatic; and the reader is frequently reminded of Thomas Fuller by such passages as this: "A university donner is a gentleman follower cheaply purchased, for his own money has hyed him, and so he is. Several reprints of the book have been issued since the author's death; and in 1671 a French translation by J. Dymock appeared with the title of Le monde ridicule. Earl was employed by Charles II. to make the Latin translation of the Eikon Basilike, published in 1649.

"Dr Earl," says Lord Clarendon in his Life, "was a man of great gaiety and devotion, a most eloquent and powerful preacher, and of a conversation so pleasant and delightful, so very innocent, and so very judicious, that no one in his society was more desired and loved. No man was more obliging in his dress and habits and manners, more wayward and cultivated in his behaviour and discourse. He was very dear to the Lord Falkland, with whom he spent as much time as he could make his own."


EARLON, Richard (1742-1822), English mezzotint engraver, was born in London in 1742. His natural faculty for art appears to have been first called into exercise by admiration for the lord mayor's state coach, just decorated by Cipriani. He tried to copy the paintings, and was sent to study under Cipriani. He displayed great skill as a draughtsman, and at the same time acquired without assistance the art of engraving in mezzotint. In 1765 he was employed by Alderman Boydell, then one of the most liberal promoters of the fine arts, to make a series of drawings from the pictures at Houghton Hall; and these he afterwards engraved in mezzotint. His most perfect works as engraver are perhaps the fruit and flower pieces after the Dutch artists Van Os and Van Huyssum. Amongst his historical and allegorical subjects are—Agrippina, after Rubens; West; Love in Bondage, after Guido Reni; the Royal Academy, the Embassy of Hydebeck to meet Lord Cornwallis, and a Tiger Hunt, the last three after Zoffany; and Lord Heathfield, after Sir Joshua Reynolds. Earlom also executed a series of 260 facsimiles of the drawings and sketches of Claude Lorrain, which were published from 6 vols. folio, under the title of Liber Veritatis (1777-1819). Earlom died in London, October 9, 1822.

EAR-RING, an ornament worn pendent from the ear, and generally suspended by means of a ring or hook passing through the pendulous lobe of the ear. The general usage appears to have been to have ear-rings worn in pairs, the two ornaments in all respects resembling each other; in ancient times, or sometimes more recently among Oriental races, a single ear-ring has sometimes been worn. The use of this kind of ornament, which constantly was of great value and sometimes was made of large size, dates from the remotest historical antiquity, the earliest mention of ear-rings occurring in the book of Genesis. It appears probable that the ear-rings of Jacob's family, which he buried with his strange idols at Bethel, were regarded as amulets or talismans, such unquestionably being the estimation in which some ornaments of this class have been held from a very early period, as they still are held in the East. Among all the Oriental races of whom we have any accurate knowledge, the Hebrews and Egyptians excepted, ear-rings always have been in general use by both sexes; while in the West, as well as by the Hebrews and Egyptians, as a matter of fashion, as they were prevalent among the Saxons, the Anglo-Saxon predecessors of the nations of modern Europe, they never have been worn only by women; and the prevalence of this fashion among the races of classic antiquity is illustrated in a singular manner by the ears of the famous statue of the Venus de' Medici being bored, evidently for the reception of pendant jewels. Ear-rings invariably having held an important position among the various remains of ancient and mediaeval goldsmiths' work that from time to time have rewarded the researches of archaeological inquirers. And these early relics, with rare exceptions objects of great beauty and delicacy, never fail to exemplify the artistic styles of their periods, as they were prevalent among the races by whom each individual jewel was produced. Ear-rings of costly materials and elaborate workmanship have been brought to light in considerable numbers in the Troad and in Peloponnese by Dr Schliemann, jewels of the same class, of exquisite beauty, and of workmanship that is truly wonderful, have been rescued from the sepulchres of ancient Etruria and Greece by Signor Castellani; other ear-rings of gold of characteristic forms have come down to our own times from the ancient Egyptians; we know well what styles of ear-rings were worn by the Romans of the empire and by the early Scandinavians; and recent researches among the burial places of our Anglo-Saxon predecessors in the occupancy of this island have led to the discovery of jewels in considerable numbers, which among their varieties include ear-rings executed in a style that proves the Anglo-Saxons to have made no inconsiderable advances in the arts of civilization. These same ornaments, which never have fallen into disuse, enjoy at the present day a very high degree of favour; like all other modern jewels, however, the ear-rings of our own times as works of arts can claim no historical attributes, because they consist as well of reproductions from all past ages and of every race as of fanciful productions that certainly can be assigned to no style of art whatever.
EARTH, FIGURE OF THE. The determination of the figure of the earth is a problem of the highest importance in astronomy, inasmuch as the diameter of the earth is the unit to which all celestial distances must be referred. Reasoning, doubtless, from the uniform level appearance of the horizon in any situation in which a spectator can be placed—the variations in altitude of the circumpolar stars as one travels towards the north or south, the disappearance of a ship standing out to sea, and perhaps other phenomena—the earliest astronomers universally regarded the earth as a sphere, and they endeavoured to ascertain its dimensions. Aristotle relates that the mathematicians had found the circumference to be 400,000 stadia. But Eratosthenes appears to have been the first who entertained an accurate idea of the principles on which the determination of the figure of the earth really depends, and attempted to reduce them to practice. His results were very inaccurate, but his method is the same as that which is followed at the present day—depending, in fact, on the comparison of a line measured on the earth's surface with the corresponding arc of the heavens. He observed that at Syene in Upper Egypt, on the day of the summer solstice, the sun was exactly vertical, whilst at Alexandria at the same season of the year its zenith distance was 7° 12', or one-fiftieth of the circumference of a circle. He assumed that these places were on the same meridian; and, reckoning their distance apart as 5000 stadia, he inferred that the circumference of the earth was 250,000 stadia. A similar attempt was made by Posidonius, who adopted a method which differed from that of Eratosthenes only in using a star instead of the sun. He obtained 240,000 stadia for the circumference. But it is impossible to form any correct opinions as to the degree of accuracy attained in these measures, as the length of the stadium is unknown. Polenoy in his Geography assigns the length of the degree as 500 stadia.

The Arabs, who were not at all prepossessing to astronomy, did not overlook the question of the earth's magnitude. The caliph Almanu'm, 814 A.D., having fixed on a spot in the plains of Mesopotamia, despatched one company of astronomers northwards and another southwards, measuring the journey by rods, until each found the altitude of the pole to have changed one degree. But the result of this measurement does not appear to have been very satisfactory. From this time the subject seems to have attracted no attention until about 1500, when Fernel, a Frenchman, measured a distance in the direction of the meridian near Paris by counting the number of revolutions of the wheel of his carriage as he travelled. His astronomical observations were made with a triangle used as a quadrant, and his resulting length of a degree was by a happy chance very near the truth.

The next geodist, Willemard Snell, took an immense step in the right direction by substituting a chain of triangles for actual linear measurement. The account of this operation was published at Leyden in 1617. He measured his base line on the frozen surface of the meadows near Leyden, and measured the angles of his triangles, which lay between Alkmaar and Bergen-op-Zoom, with a quadrant and semicircles. He took the precaution of comparing his standard with that of the French, so that his result was expressed in toises (the length of the toise is about 6.39 English feet). The work was recomputed and reconsidered by Muschenbroek in 1729. In 1637 an Englishman, Richard Norwood, published his own determination of the figure of the earth in a volume entitled The Seaman's Practice, containing a Fundamental Problem in Navigation experimentally verified, namely, touching the Compass of the Earth and Sea and the Longitude of a Degree in our English Mowtines. It appears that he observed on the 11th June 1633 the sun's meridian altitude in London as 62° 1', and on June 6, 1635, his meridian altitude in York as 59° 33'. He measured the distance between these places along the public road partly with a chain and partly by pacing. By this means, through compensation of errors, he arrived at 367,176 feet for the degree—which is very far removed from the truth.

The application of the telescope to circular instruments was the next important step in the science of measurement. Picard was the first who in 1669, with the telescope, using such precautions as the nature of the operation requires, measured an arc of meridian. He measured with wooden rods a base line of 5663 toises, and a second or base of verification of 3902 toises, his triangulation extending from Malvissane, near Paris, to Sourdun, near Amiens. The angles of the triangles were measured with a quadrant furnished with a telescope having cross-wires in its focus. The difference of latitude of the terminal stations was determined by observations made with a sector on a star in Cassiopea, giving 1° 22' 55'' for the amplitude. The terrestrial measurement gave 78,650 toises, whence he inferred for the length of the degree 57,600 toises.

Huygens' geodetic observations had been confined to the determination of the magnitude of the earth considered as a sphere, but a discovery made by Richer turned the attention of mathematicians to its deviation from a spherical form. This astronomer, having been sent by the Academy of Sciences of Paris to the island of Cayenne, in South America, for the purpose of determining the amount of terrestrial refraction and other astronomical objects, observed that his clock, which had been regulated at Paris to beat seconds, lost about two minutes and a half daily at Cayenne, and that in order to bring it to measure mean solar time it was necessary to shorten the pendulum by more than a line. This fact, which appeared exceedingly curious, and was scarcely credited till it had been confirmed by the subsequent observations of Varin and Deshayes on the coasts of Africa and America, was first explained in the third book of Newton's Principia, who showed that it could only be referred to a diminution of gravity arising either from a protuberance of the equatorial parts of the earth and consequent increase of the distance from the centre or from the counteracting effect of the centrifugal force. About the same time, 1673, appeared the work of Huygens entitled De Horologio Oscillatorio, in which for the first time were found correct notions on the subject of centrifugal force. It does not, however, appear that they were applied to the theoretical investigation of the figure of the earth before the publication of Newton's Principia. In 1699 Huygens, following up the subject, published his treatise entitled De Causa Gravitationis, which contains an investigation of the figure of the earth on the supposition that the attraction of every particle is towards the centre.

Between 1684 and 1718 J. and D. Cassini, starting from Picard's base, carried a triangulation northwards from Paris to Dunkirk and southwards from Paris to Collioure. They measured a base of 7416 toises near Perpignan, and a somewhat shorter base near Dunkirk, and from the northern portion of the arc, which had an amplitude of 2° 12' 9", obtained for the length of a degree 56,960 toises, while from the southern portion, of which the amplitude was 6° 18' 57", they obtained 57,097 toises. The immediate inference from this was that, the degree diminishing with increasing latitude, the earth must be a prolate spheroid. This conclusion was totally opposed to the theoretical investigations of Newton and Huygens, and created a great sensation among the scientific men of the day. The question was far too important to be allowed to remain unsettled, and accorded to the Academy of Sciences of Paris determined to apply a decisive test by the measurement of area at a great distance from each other. For this purpose some of the most distinguished
members of their body undertook the measurement of two meridian arcs—one in the neighbourhood of the equator, the other in a high latitude; and so arose the celebrated expeditions of the French Academicians. In May 1735, M.M. Godin, Bouguer, and De la Condamine, under the auspices of Louis XV., proceeded to Peru, where, assisted by two Spanish officers, after ten years of laborious exertion they measured an arc of $\text{arc}^\circ 7'$ intersected by the equator. The second party consisted of Maupertuis, Clairaut, Cassini, Lemonnier, and Outhier, who reached the Gulf of Bothnia in July 1736; they were in some respects more fortunate than the first party, inasmuch as they completed the measurement of an arc near the polar circle of $57'$ amplitude and returned to Europe within sixteen months from the date of their departure.

The measurement of Bouguer and De la Condamine was executed with great care, and on account of the locality, as well as the manner in which all the details were conducted, it has always been regarded as a most valuable determination. The southern limit was at a place called Tarquis, the northern at Cotehequi. A base of 62,722 toises was measured in the vicinity of Quito, near the northern extremity of the arc, and a second base of 53,610 toises near the southern extremity. The mountainous nature of the country made the work very laborious, in some instances the difference of heights of two neighbouring stations exceeding a mile. The difficulties with which the observers had to contend were increased by the opposition of the more ignorant of the inhabitants, and they were at times in danger of losing their lives. They had also much trouble with their instruments, those with which they were to determine the latitudes proving untrustworthy. But their energy and ingenuity were equal to the occasion, and they succeeded by simultaneous observations of the same star at the two extremities of the arc in obtaining very fair results. The whole length of the arc amounted to 176,945 toises, while the difference of latitudes was $3^\circ 7'3''$. In consequence of a misunderstanding that arose between De la Condamine and Bouguer, their operations were conducted separately, and each wrote a full and interesting account of the operation. Bouguer's book was published in 1749; that of De la Condamine in 1751. The toise used in this measure was ever after regarded as the standard toise, and is always referred to as the Toise of Peru.

The party of Maupertuis, though their work was quickly despatched, had also to contend with great difficulties. They were disappointed in not being able to make use of the small islands in the Gulf of Bothnia for the trigonometrical stations, and were forced to penetrate into the forests of Lapland. They commenced operations at Torna, a city situated on the mainland near the extremity of the gulf. From this, the southern extremity of their arc, they carried a chain of triangles northward to the mountain Kittis, which they selected as the northern terminus. In the prosecution of this work they suffered greatly from cold and the bites of flies and gnats. The latitudes were determined by observations with a sector (made by Graham) of the zenith distance of $\alpha$ and $\delta$ Draconis. The base line was measured on the frozen surface of the river Torna about the middle of the arc, two parties measured it separately, and they differed by about 4 toises. The result of the whole was that the difference of latitudes of the terminal stations was $57^\circ 29'6''$, and the length of the arc 55,023 toises. In this expedition, as well as in that to Peru, observations were made with a pendulum to determine the force of gravity; and these observations coincided with the geodetical results in proving that the earth was an ellipsoid and not prolate.

In 1740 was published in the Paris Mémoires an account, by Cassini de Thury, of a remeasurement of himself and Lacaille of the meridian of Paris. With a view to determine more accurately the variation of the degree along the meridian, they divided the same from the Cape of Good Hope to Collioure into four partial arcs of about two degrees each, by observing the latitude at five stations. The anomalous results previously obtained by J. and D. Cassini were not confirmed, but on the contrary the length of the degree derived from these partial arcs showed on the contrary an increase with increasing latitude. In continuation of their labours, Cassini and Lacaille further measured an arc of parallel across the mouth of the Rhone. The difference of time of the extremities was determined by the observers at either end noting the instant of a signal given by flashing gunpowder at a point near the middle of the arc.

While at the Cape of Good Hope in 1752, engaged in various astronomical observations, Lacaille measured an arc of meridian of $1^\circ 13'17''$, which gave him for the length of the degree 57,037 toises—an unexpected result, which has led to the modern remeasurement of the arc by Sir Thomas Maclear.

Passing over the measurements made between Rome and Rimini and on the plains of Piedmont by the Jesuit Boscovich and Beccaria, and also the arc measured with deal rods in North America by Messrs. Mason and Dixon, we come to the commencement of the English triangulation. In 1735, in consequence of a representation from Cassini de Thury on the advantages that would accrue to science from the geodetic connection of Paris and Greenwich, General Roy was with the king's approval appointed by the Royal Society to conduct the operations on the part of this country,—Count Cassini, Mechain, and Delambre being appointed on the French side. And now a precision previously unknown was brought into geodesy by the use of Ramsden's splendid theodolite, which was the first to make the spherical excess of triangles measurable. The wooden rods with which the first base was measured were speedily replaced by brass rods, which again were rejected for the steel chain of Ramsden. The details of this operation are fully given in the Account of the Trigonometrical Survey of England and Wales. Shortly after this, the National Convention of France, having agreed to remodel their system of weights and measures, chose, as applicable to all countries, for their unit of length the ten-millionth part of the meridian quadrant. In order to obtain this length precisely, the remeasurement of the French meridian was resolved on, and deputed to Delambre and Mechain. The details of this great operation will be found in the Base du Systeme Métrique Décimal. The arc was subsequently extended by M.M. Biot and Arago to the island of Iwia.

The appearance in 1838 of Bessel's classical work entitled Gradmessung in Ostpreussen marks an era in the science of geodesy. Here we find the method of least squares, a branch of the theory of probabilities, applied to the calculation of a network of triangles and the reduction of the observations generally. This work has been looked on as a model ever since, and probably it will not soon be surpassed as such. The systematic manner in which all the observations were taken with the view of securing final results of extreme accuracy is admirable. The triangulation, which is a small one, extends about a degree and a half along the shores of the Baltic in a N.N.W. direction. The compound bars with which he measured his base line may be understood by the following brief description. On the surface of an iron bar two toises in length is laid a zinc bar, both being perfectly planed and in free contact—the zinc bar being slightly shorter than the iron bar. They are united at one end into a spherical cap, the difference of length of the bars as seen at the other end varies; this difference of length is a thermometrical indica-
tion whereby a correction for temperature can be applied to the bars so as to reduce their length to that at the standard temperature. The bars in measuring were not allowed to come into contact, but the intervals left were measured by the interpolation of a glass wedge. The results of all the comparisons of the four measuring rods with one another, and with the standards, are elaborately worked out by least squares. The angles were observed with theodolites of 12 and 15 inches diameter, and the latitudes determined by means of the transit instrument in the prime vertical—a method much used in Germany. The formulæ employed in the reduction of the astronomical observations are very elegant. The reduction of the triangulation was carried out in the most thorough manner,—the sum of the squares of all the actual theodolite observations being made a minimum. As it is usual now to follow this method (sometimes only approximately) in all triangulations where great precision is required, we here give a brief description of the method. The equations of condition of a triangulation are those which exist between the supernumerary observed quantities and their calculated values, for, after there are just sufficient observations to fix all the points, then any angle that may be subsequently observed can be compared with its calculated value. If a triangulation consist of $n + 2$ points, two of which are the ends of a base line, then to fix the $n$ points $2n$ angles suffice, so that if $m$ be the actual number of angles really observed, the triangulation must afford $m - 2n$ equations of condition. To show how these arise, suppose that from a number $m$ of fixed points $A, B, C, \ldots$ a new point $P$ is observed, which $m$ points are again observed from $P$, then there will be formed $m - 1$ triangles, in each of which the sum of the observed angles is $180^\circ +$ the spherical excess, thus gives at once $m - 1$ equations of condition. The $m - 2$ distances will each afford an equation of the form

$$
PQ \times PB = PA \times PC \times 1,
$$

not, however, limited to three factors. Should $P$ observe the $m$ points and not be observed back, there will be $m - 3$ equations of the above form (they are called side equations). In a similar manner other cases can be treated. In practice the ratios of sides are replaced by the ratios of the sines of the corresponding opposite angles. To each observed angle a symbolical correction is applied, so that if $a$ be an observed angle and $a + x$ the true or most probable angle, $\sin a + x = \sin a(1 + \text{cot} a)$, $a$ being a small angle whose square is neglected. Thus the side equation takes the form

$$
\beta + \beta_1 + \beta_2 + \ldots + \beta_m = 0
$$

In the case of equations formed by adding together the three observed angles of a triangle the co-efficients are of course unity. The problem then is this. Given $n$ equations

$$
\beta + \beta_1 + \beta_2 + \ldots + \beta_m = 0
$$

between $m(m > n)$ unknown quantities $x_1, x_2, \ldots, x_n$, which are the corrections (expressed in seconds of arc) to the observed angles, we have to determine these quantities so as to render the function

$$
\sum \beta x_1^2 + \sum \beta_1 x_1^2 + \sum \beta_2 x_2^2 + \ldots + \sum \beta_m x_n^2
$$

a minimum, where $\sum \beta, \sum \beta_1, \sum \beta_2, \ldots, \sum \beta_m$ are the weights of the determinations of the angles to which the corresponding corrections belong. The equations $x_1, x_2, \ldots, x_n$ raffling this condition of minimum have, according to the theory of least squares, a higher probability than any other system of corrections that merely satisfy the equations of condition. Multiply the $n$ equations by multipliers $\lambda_1, \lambda_2, \ldots, \lambda_n$, and we obtain the theory of maxima and minima of $m$ equations

$$
\lambda_1 \beta_1 + \lambda_2 \beta_2 + \ldots + \lambda_n \beta_n = 0
$$

The values of $x_1, x_2, \ldots, x_n$ obtained from these equations are to be substituted in the original equations of condition, and then there will be $m$ equations between the $n$ multipliers $\lambda_1, \lambda_2, \ldots, \lambda_n$. These being solved, the numerical values of $\lambda_1, \lambda_2, \ldots, \lambda_n$ are obtained, and are substituting these in the last equations written down, the values of $x_1, x_2, \ldots, x_n$ will follow. The process is a long and tedious one, but it is inevitable if we wish very good results.

The great meridian arch in India was commenced by Colonel Lambton at Punnace in latitude $8^\circ 9'$. Following generally the methods of the English survey, he carried his triangulation as far north as $20^\circ 30'$. The work then passed into the able hands of Sir George (then Captain) Everest, who continued it to the latitude of $29^\circ 30'$. Two admirably written volumes by Sir George Everest, published in 1830 and in 1847, give all the details of the vast undertaking. The great trigonometrical survey of India is now being prosecuted with great scientific skill by Colonel Walker, R.E., and it may be expected that we shall have some valuable contributions to the great problem of geodesy. The working out of the Indian chains of triangles by the method of least squares presents peculiar difficulties, but enormous in extent as the work is, it is being thoroughly carried out. The ten base lines on which the survey depends were measured with Colby's compensation bars. These compensation bars were also used by Sir Thomas Macdowall in the measurement of the base line in his extension of Lacalle's arc at the Cape. The account of this operation will be found in a volume entitled Verification and Extension of Lacalle's Arc of Meridian at the Cape of Good Hope, by Sir Thomas Macdowall, published in 1866. Lacalle's amplitude is verified, but not his terrestrial measurement.

The number of stations in the principal triangulation of Great Britain and Ireland is about 250. At 32 of these the latitudes were determined with Ramsden's and Airy's zenith sectors. The theodolites used for this work were, in addition to the two great theodolites of Ramsden which were used by General Roy and Captain Kater (and which are now in as good condition as when they came from the hands of the maker), a smaller theodolite of 18 inches diameter by the same mechanism, and another of 24 inches diameter by Mears Troughton and Simms. The compensation bars for determination of absolute azimuths were made with these instruments at a large number of stations, the stars $\alpha$, $\delta$, and $\eta$ Ursae Minoris and 51 Cephei being those observed, always at the greatest azimuths. At six of these stations the probable error of the result is under $0^\circ 4$, at twelve under $0^\circ 5$, at thirty-four under $0^\circ 7$ so that the absolute azimuth of the whole network is determined with extreme accuracy. Of the seven base lines which have been measured, five were by means of steel chains and two with Colby's compensation bars. This is a system of six compound bars self-correcting for temperature. The compound bar may be thus described. Two bars, one of brass and the other of iron, are laid side by side, parallel, and firmly united at their centres, from which they are free to expand or contract, at the standard temperature they are of the same length. Let $AB$ be one bar, $AB'$ the other, draw a line through the corresponding extremities $A$, $A'$ to $P$, and a line through the other extremities $B$, $B'$ to $Q$, make $AP = EQ$, $AA'$ being $BB'$. Now if $AB$ is to $AP$ as the rate of expansion of the bar $AB'$ to the rate of expansion of the bar $AB$, then clearly the distance $PQ$ will be invariable, or very nearly so. In
the actual instrument P and Q are finely engraved dots at the distance of 10 feet apart. In the measurement the bars when aligned do not come into contact; an interval of six inches is left between each bar and its neighbour. This small space is measured by an ingenious micrometrical arrangement constructed on exactly the same principle as the bars themselves. The triangulation was computed by least squares. The total number of equations of condition for the triangulation is 920; if therefore the whole had been reduced in one mass, so as it should have been, the solution of an equation of 920 unknown quantities would have occurred as a part of the work. To avoid this an approximation was resorted to; the triangulation was divided into twenty-one parts or figures; four of these, not adjacent, were first adjusted by the method explained, and the corrections thus determined in these figures carried into the equations of condition of the adjacent figures. The average number of equations in a figure is 44; the largest equation is one of 77 unknown quantities.1

Aby’s Zenith Sector is too well known to need description. The vertical limb is read by four microscopes; altogether, in the complete observation of a star there are 10 micrometer readings and 12 level readings. In some recent observations in Scotland for latitude the Zenith Telescope has been used with very great success; it is very yet used; and a complete determination of latitude, affected with the mean of the declination errors of two stars, is effected by two micrometer readings and four level readings. The observation consists in measuring with the telescope micrometer the difference of zenith distances of two stars which cross the meridian, one to the north and the other to the south of the observer; at zenith distances which differ by not much more than 10° or 15°, the interval of the times of transit being not less than one nor more than twenty minutes. The advantages are that, with simplicity in the construction of the instrument and facility in the manipulation, reduction is eliminated (or nearly so), as the stars are generally selected within 2° of the zenith, and there is no large divided circle. The telescope, which is counterposed on one side of the vertical axis, has a small circle for finding, and there is also a small horizontal circle. This instrument is universally used in American geodesy.

The United States Coast Survey has a principal triangulation extending for about 9° 30′ along the coast, but the final results are not yet published. In 1850 was published F. G. Struve’s Arc du Méridien de 20° 30′ entre le Danube et la Mer Glaciale mesuré depuis 1816 jusqu’en 1848. This work is the record of a vast amount of scientific labour and is the greatest contribution yet made to the question of the figure of the Earth. The latitudes of the thirteen astronomical stations of this arc were determined partly with vertical circles and partly by means of the transit instrument in the prizm vertical. The triangulation, a great part of which, however, is a simple chain of triangles, is reduced by the method of least squares, and the probable errors of the resulting distances of parallels is given; the probable error of the whole arc in length is 6 2/10; less than the average length of a base line is 13,100 feet. The azimuths were observed at fourteen stations. In high latitudes the determination of the meridian is a matter of great difficulty; nevertheless the azimuths at all the northern stations were successfully determined,—the probable error of the result at Fuglenes being 0° 33′.

1 See the volume of the Ordnance Survey, entitled Account of the Principal Triangulation of Great Britain and Ireland, by Captain A. R. Clarke, B.E., F.R.S., 1856.

The problem of the figure of the earth treated as a question of mechanics or hydrostatics is one of great difficulty, and it would be quite impracticable but for the circumstance that the surface differs but little from a sphere. In order to express the forces at any point of the body arising from the attraction of its particles, the form of the surface is required, but this form is the very one which it is the object of the investigation to discover; hence the complexity of the subject, and even with all the present resources of mathematicians only a partial and imperfect solution can be obtained, and that not without some labour. We may, however, here briefly indicate the line of reasoning by which some of the most important of the results we
have alluded to above may be obtained. The principles of hydrostatics show us that if \( X, Y, Z \) be the components parallel to three rectangular axes of the forces acting on a particle of a fluid mass at the point \( x, y, z \), then, \( \rho \) being the pressure there, and \( \rho \) the density,

\[
dp = \rho \, (dx + dy + dz) \frac{dV}{dx + dy + dz},
\]

and for equilibrium the necessary conditions are, that \( \rho (dx + dy + dz) \) be a complete differential, and at the free surface \( Xdx + Ydy + Zdz = 0 \). This equation implies that the resultant of the forces is normal to the surface at every point, and in a homogeneous fluid it is evidently the differential equation of all surfaces of equal pressure. If the fluid be heterogeneous then it is to be remarked that for forces of attraction according to the ordinary law of gravitation, if \( X, Y, Z \) be the components of the attraction of a mass whose potential is \( V \), then

\[
Xdx + Ydy + Zdz = \frac{\partial V}{\partial x} \, dx + \frac{\partial V}{\partial y} \, dy + \frac{\partial V}{\partial z} \, dz,
\]

which is a complete differential. And in the case of a fluid rotating with uniform velocity, in which the so-called centrifugal force enters as a force acting on each particle proportional to its distance from the axis of rotation, the corresponding part of \( Xdx + Ydy + Zdz \) is obviously a complete differential. Therefore for the forces with which we are now concerned \( Xdx + Ydy + Zdz = dU \), where \( U \) is some function of \( x, y, z \), and it is necessary for equilibrium that \( dp = \rho dU \) be a complete differential, that is, \( \rho \) must be a function of \( U \) or a function of \( p \), and so also \( p \) a function of \( U \). So that \( dU = 0 \) is the differential equation of surfaces of equal pressure and density.

We may now show that a homogeneous fluid mass in the form of an oblate ellipsoid of revolution having a uniform velocity of rotation can be in equilibrium. It may be proved that the attraction of the ellipsoid \( x^2 + y^2 + z^2(1+\varepsilon) = c^2(1+\varepsilon) \) upon a particle \( P \) of its mass at \( x, y, z \) has for components

\[
X = Ax, \quad Y = Ay, \quad Z = Cz,
\]

where

\[
A = 2\pi \left( \frac{1 + \varepsilon}{2} \tan^{-1} \varepsilon - \frac{1}{2} \right),
\]

\[
C = 4\pi \left( \frac{1 + \varepsilon}{2} - \frac{1 + \varepsilon}{2} \tan^{-1} \varepsilon \right).
\]

Besides the attraction of the mass of the ellipsoid, the centrifugal force at \( P \) has for components \( -xw^2, -yw^2, 0 \), then the condition of fluid equilibrium is

\[
(A - w^2)dx + (A - w^2)ydy + Cdz = 0,
\]

which by integrating gives

\[
(A - w^2)(x^2 + y^2) + Cz = \text{constant},
\]

This is the equation of an ellipsoid of rotation, and therefore the equilibrium is possible. The equation concides with that of the surface of the fluid mass if we make

\[
A - w^2 = \frac{C}{1 + \varepsilon},
\]

which gives

\[
w^2 = \frac{3 + \varepsilon}{1 + \varepsilon} \tan^{-1} \varepsilon - \frac{3}{1 + \varepsilon}.
\]

If we would determine the maximum value of \( w \) from this equation, we find that it corresponds to the value of \( \varepsilon \) determined by the condition

\[
\tan^{-1} \varepsilon = \frac{9\varepsilon + 7\varepsilon^3}{(1 + \varepsilon^2)(\varepsilon^2 + 4)}\]

hence it may be shown that if the angular velocity exceed that calculated from \( \omega = 0.2497 \), equilibrium is impossible for the form of an ellipsoid of revolution. If \( \omega \) fall short of this limit, there are two ellipsoids which satisfy the condition of equilibrium; in one of these the eccentricity is greater and in the other less than 0.93. In the case of the earth, which is nearly spherical, we get by expanding the expression for \( w^2 \) in powers of \( \varepsilon^2 \), rejecting the higher powers, and remarking that the ellipticity \( e = \frac{1}{2} \varepsilon^2 \),

\[
2w^2 = 4\pi e^2.
\]

Now, if \( m \) be the ratio of the centrifugal force at the equator to gravity there,

\[
m = \frac{c^2}{\frac{3}{2} \rho m - c^2}, \quad \frac{m}{2w^2} = \frac{3}{5} \left( 1 - \frac{c}{m} \right).
\]

In the case of the earth it is a matter of observation that \( m = \frac{3}{5} \), hence the ellipticity

\[
e = \frac{5}{3} \frac{c}{m} = \frac{1}{231},
\]

so that the ratio of the axes on the supposition of a homogeneous fluid earth is 230. 231, as announced by Newton.

Now, to come to the case of a heterogeneous fluid, we shall assume that its surfaces of equal density are spheroids, concentric and having a common axis of rotation, and that the ellipticity of these surfaces varies from the centre to the outer surface, the density also varying. In other words, the body is composed of homogeneous spheroidal shells of variable density and ellipticity. On this supposition we shall express the attraction of the mass upon a particle in its interior, and then, taking into account the centrifugal force, form the equation expressing the condition of fluid equilibrium. The attraction of the homogeneous spheroid

\[
x^2 + y^2 + z^2(1+2\varepsilon) = c^2(1 + 2\varepsilon),
\]

where \( e \) is the ellipticity of which the square is neglected, on an internal particle, whose co-ordinates are \( x = f, y = 0, z = h \), has for its \( x \) and \( z \) components

\[
X = \frac{4}{3} \rho f \frac{c^2}{1 + 2\varepsilon}, \quad Z = \frac{4}{3} \rho h \frac{c^2}{1 + 2\varepsilon},
\]

the \( Y \) component being of course zero. Hence we infer that the attraction of a shell whose inner surface has an ellipticity \( c_1 \) and its outer surface an ellipticity \( e + de \), the density being \( \rho \), is expressed by

\[
dX = - \frac{4}{3} \rho f \frac{c^1}{1 + 2\varepsilon} dc, \quad dZ = - \frac{4}{3} \rho h \frac{c^1}{1 + 2\varepsilon} de.
\]

To apply this to our heterogeneous spheroid, if we put \( c_1 \) for the semiaxis of that surface of equal density on which is situated the attracted point \( P \), and \( c_0 \) for the semiaxis of the outer surface, the attraction of that portion of the body which is exterior to \( P \), namely, of all the shells which inclose \( P \), has for components

\[
x_0 = - \frac{8}{15} \pi f \frac{c^0}{1 + 2\varepsilon} dc, \quad z_0 = \frac{16}{15} \rho \frac{h}{1 + 2\varepsilon} de,
\]

both \( e \) and \( \rho \) being functions of \( c \). Again the attraction of a homogeneous spheroid of density \( \rho \) on an external point \( f, h \) has the components

\[
x = \frac{4}{3} \rho \frac{c^0}{1 + 2\varepsilon} \left( \chi (1 + 2\varepsilon) - \lambda c^0 \right),
\]

\[
z = \frac{4}{3} \rho \frac{c^0}{1 + 2\varepsilon} \left( \chi (1 + 2\varepsilon) - \lambda c^0 \right),
\]

where \( \lambda = \frac{3}{5} \frac{4h^2 - R^2}{r^2}, \quad \chi = \frac{3}{5} \frac{2h^2 - 3R^2}{r^2}, \) and \( r^2 = f^2 + h^2 \).

Now \( e \) being considered a function of \( c \), we can at once express the attraction of a shell (density \( \rho \)) contained between the surface defined by \( c + dc \), \( c - de \) and that defined by \( c, e \) upon an external point, the differentials \( c, de \) and \( c, e \) with respect to \( c, e \), viz. \( dX, dZ \), must then be integrated with \( \rho \) under the integral sign as being a function of \( c \). The integration will extend from \( c = 0 \) to \( c = s \). Thus the components of the attraction of the heterogeneous spheroid

\[
\text{VII.} - 76
\]
upons a particle within its mass, whose coordinates are \( f, 0, h \), are

\[
X = -\frac{4}{5} \pi \rho f \left\{ \frac{1}{5} \int_0^1 \rho d \sigma \left( 1 + 2a^2 + \frac{2}{5} \sigma (\sigma^2 - 1) \right) \right\}
\]

\[
Z = \frac{4}{5} \pi \rho h \left\{ \frac{1}{5} \int_0^1 \rho d \sigma \left( 1 + 2a^2 + \frac{2}{5} \sigma (\sigma^2 - 1) \right) \right\}
\]

We take into account the rotation of the earth by subtracting the centrifugal force \( f^2 = F \) from \( X \). Now, the surface of constant density upon which the point \( f, 0, h \) is situated gives \( (1 - 2a^2)f + kh = 0 \); and the condition of equilibrium is that \( (X - F)f + Z = 0 \). Therefore,

\[
(X - F)h = Zf(1 - 2a^2)
\]

which, neglecting small quantities of the order \( e^2 \) and putting \( \rho d \sigma = 4\pi e^2 \), gives

\[
\frac{2\pi}{3} \int_0^1 \rho d \sigma \left( 1 + 2a^2 - \frac{6}{5} \sigma (\sigma^2 - 1) \right) = \frac{2\pi}{3} \int_0^1 \rho d \sigma \left( 1 - 2a^2 \right).
\]

Here we must put now \( c \) for \( c_1 \), \( f \) for \( f_1 \), and \( 1 + 2e \) under the integral sign may be replaced by unity. Two integrations lead us to the following very important differential equation:

\[
\frac{2\pi}{3} \int_0^1 \rho d \sigma (1 + 2a^2) = \frac{2\pi}{3} \int_0^1 \rho d \sigma (1 - 2a^2),
\]

and putting \( c = c_0 \) in the equation expressing the condition of equilibrium, we find

\[
M(2r - m) = \frac{2\pi}{3} \int_0^1 \rho d (\rho^2 d\sigma).
\]

Making these substitutions in the expressions for the forces at the surface, and putting \( r = 1 + \epsilon - e \cos \theta \), we get

\[
G \cos \phi = \frac{M}{ac} \left\{ 1 + e | \frac{3}{2} - \frac{5}{2} m - \frac{5}{2} \left( m - 2a^2 \right) \left( \frac{5}{3} - m \right) \right\} \frac{2\pi}{3} \int_0^1 \rho d (\rho^2 d\sigma),
\]

\[
G \sin \phi = \frac{M}{ac} \left\{ 1 + e | \frac{3}{2} + \frac{5}{2} m + \frac{5}{2} \left( m - 2a^2 \right) \left( \frac{5}{3} - m \right) \right\} \frac{2\pi}{3} \int_0^1 \rho d (\rho^2 d\sigma).
\]

Here \( G \) is gravity in the latitude \( \phi \), and \( a \) the radius of the equator. Since \( \sin \phi = \frac{2\pi}{3} \int_0^1 \rho d (\rho^2 d\sigma) \), we get

\[
G = \frac{M}{ac} \left\{ \frac{1}{2} \int_0^1 \rho d (\rho^2 d\sigma) \right\}.
\]

which expression contains the theorems we have referred to as discovered by Clairaut.

The theory of the figure of the earth as a rotating ellipsoid has proved an attractive subject to many of the greatest mathematicians, Laplace especially, who has devoted a large portion of his Mécanique Céleste to it. In English the principal existing works on the subject are Sir George Airy's Mathematical Tracts, where the subject is treated in the lucid style so characteristic of its author, but without the use of Laplace's coefficients, Archdeacon Pratt's Attractions and Figure of the Earth, and O'Brian's Mathematical Tracts, in the last two Laplace's coefficients are used. In the Cambridge Tracts, vol. vi., is a valuable essay by Professor Stokes, in which he proves, without making any assumption whatever as to the ellipticity of internal strata, or as to the past or the present fluidity of the earth that if the external form of the sea—imagined to percolate the land by canals—be a spheroid with small ellipticity, then the law of gravity will be that found above \( \epsilon \). An important theorem by Jacoby must not be overlooked. He proved that for a homogeneous fluid in rotation a spheroid is not the only form of equilibrium; an ellipsoid rotating round its least axis may with certain proportions of the axes and a certain time of revolution be a form of equilibrium.\(^2\)

Local Attraction.

In speaking of the figure of the earth, we mean the surface of the sea imagined to percolate the continents by canals. That this surface should turn out, after precise measurements, to be exactly an ellipsoid of revolution is a priori improbable. Although it may be highly probable that originally the earth was a fluid mass, yet in the cooling whereby the present crust has resulted, the actual solid surface has been left in form the most irregular. It is clear that these irregularities of the visible surface must be accompanied by irregularities in the mathematical figure of the earth, and great care must be taken that the error in the major semiaxes may not be precisely any surface of revolution. Nevertheless, there must exist some spheroid which agrees very closely with the mathematical figure of the earth.

\(^1\) See also a paper by Professor Stokes, in the Cambridge and Dublin Mathematical Journal, vol. iv. 1849.

\(^2\) See a paper in the Proceedings of the Royal Society, No. 123 1870, by L. Todhunter, M.A., F.R.S.
each in mean latitudes, and near each other, say about five degrees of latitude apart, the probable error of the resulting value of the ellipticity will be approximately \( \varepsilon \), being expressed in seconds, so that if \( \infty \) be so great as 2\(^\circ\) the probable error of the resulting ellipticity will be greater than the ellipticity itself. It is not only interesting, but necessary at times, to calculate the attraction of a mountain, and the consequent disturbance of the astronomical zenthr, at any point within its influence. The deflection of the plumb-line, caused by a local attraction whose amount is \( \Delta_s \), is measured by the ratio of \( \Delta s \) to the force of gravity at the station. Expressed in seconds, the deflection \( \Delta \) is

\[
\Delta = 12'' \cdot \frac{472}{\rho}
\]

where \( \rho \) is the mean density of the earth, \( \delta \) that of the attracting mass,—the linear unit in expressing \( \Delta \) being a mile. Suppose, for instance, a table-land whose form is a rectangle of twelve miles by eight miles, having a height of 500 feet and density half that of the earth, let the observer be two miles distant from the middle point of the longer side. The deflection then is 1'\(^\circ\) 472, but at one mile it increases to 2'\(^\circ\) 20. At sixteen astronomical stations in the English Survey the disturbance of latitude due to the form of the ground has been computed, and the following will give an idea of the results. At six stations the deflection is under 2', at six others it is between 2' and 4', and at four stations it exceeds 4'.

There is one very exceptional station on the north coast of England, near the village of Portsea, at which the deflection amounts to 10', so that if that village were placed on a map in a position to correspond with its astronomical latitude, it would be 1000 feet out of position. There is the sea to the north and an undulating country to the south, which, however, to a spectator at the station does not suggest any great disturbance of gravity. A somewhat rough estimate of the local attraction from external causes gives a maximum limit of 5\(^\circ\), therefore we have 5\(^\circ\) unaccounted for, or rather which must arise from unequal density in the underlying strata in the surrounding country. In order to throw light on this remarkable phenomenon, the latitudes of a number of stations between Narm on the west, Fraserburgh on the east, and the Grampians on the south, were observed, and the local deflection determined. It is somewhat angular that the deflections diminish in all directions, not very regularly certainly, and most slowly in a south-west direction, finally disappearing, and leaving the maximum at the original station at Portsea.

The method employed by Dr Heath for computing the attraction of masses of ground is so simple and effectual that it can hardly be improved on. Let a horizontal plane pass through the given station; let \( r, \theta \) be the polar coordinates of any point in this plane, and \( r_1, \theta_1 \) the coordinates of a particle of the attracting mass, and let it be required to find the attraction of a portion of the mass contained between the horizontal planes \( z = 0, z = h \), the cylindrical surfaces \( r = r_1, r = r_2 \), and the vertical planes \( \theta = \theta_1, \theta = \theta_2 \). The component of the attraction at the station or origin along the line \( \theta = 0 \) is

\[
\frac{\mu}{2 \pi} \left( \frac{r^2}{r^2 + h^2} \right) \left( \frac{r^2}{r^2 + h^2} \right) \cos \theta_1 \cos \theta_2 \log \frac{r + \sqrt{r^2 + h^2}}{r_2 + \sqrt{r_2^2 + h^2}}
\]

By taking \( r_2 \) sufficiently small, and supposing \( h \) also small, as it usually is, compared with \( r_1 + r_2 \), the attraction is

\[
-\frac{3}{2} k \frac{\mu}{2 \pi} \left( \frac{r^2}{r^2 + h^2} \right) \cos \theta_1 \cos \theta_2 \log \frac{r + \sqrt{r^2 + h^2}}{r_2 + \sqrt{r_2^2 + h^2}}
\]

where \( r = \frac{1}{2} (r_1 + r_2) \). This form suggests the following procedure. Draw on the contoured map a series of equidistant circles, concenter with the station, intersected by radial lines so disposed that the areas of their annuli are in arithmetical progression. Then, having estimated from the map the mean heights of the various compartments, the calculation is obvious.

In mountainous countries, as near the Alps and in the Caucasus, deflections have been observed to the amount of as much as 29\(^\circ\). On the other hand, deflections have been observed in flat countries, such as that noted by Professor Schweizer, who has shown that, at certain stations in the vicinity of Moscow, within a distance of 15 miles the plumb-line varies 16\(^\circ\) in such a manner as to indicate a vast deficiency of matter in the underlying strata. But these are exceptional cases. Since the attraction of a mountain mass is expressed as a numerical multiple of \( \delta/\rho \), the ratio of the density of the mountain to that of the earth, if we have any independent means of ascertaining the amount of the deflection, we have at once the ratio \( \rho/\delta \), and thus we obtain the mean density of the earth, as, for instance, at Schelchthon, and more recently at Arthur's Seat. A compact mass of great density at a small distance under the surface of the earth will produce an elevation of the mathematical surface which is expressed by the formula

\[
y = a \left[ \frac{1}{(1 + \kappa^2 - 2 \kappa \cos \theta)^{1/2}} \right] - 1
\]

where \( a \) is the radius of the (spherical) earth, \( a(1-\kappa) \) the distance of the disturbing mass below the surface, \( \mu \) the ratio of the disturbing mass to the mass of the earth, and \( a(1-\kappa) \) the distance of any point on the surface from that point, say \( Q \), which is vertically over the disturbing mass. The maximum value of \( y \) is at \( Q \), where it is

\[
y = -a \frac{k}{1 - \kappa} - \frac{a^2}{2}
\]

The deflection at the distance \( a(1-\kappa) \) is

\[
\Delta = -a \frac{k}{1 - \kappa} \frac{a^2}{2}
\]

or since \( \theta \) is small, putting \( h = \kappa = 1 \),

\[
\Delta = -a \frac{a^2}{2}
\]

The maximum deflection takes place at a point whose distance from \( Q \) is to the depth of the mass as \( 1 : \sqrt{2} \), and its amount is

\[
\frac{\mu}{2 \pi} \frac{a^2}{2}
\]

If, for instance, the disturbing mass were a sphere a mile in diameter, the excess of its density above that of the surrounding country being equal to half the density of the earth, and the depth of its centre half a mile, the greatest deflection would be 5\(^\circ\), and the greatest value of \( y \) only two inches. Thus a large disturbance of gravity may arise from an irregularity in the mathematical surface whose actual magnitude, as regards height at least, is extremely small.

The effect of the disturbing mass \( \mu \) on the vibrations of a pendulum would be a maximum at \( Q \), if \( v \) be the number of seconds of time gained per day by the pendulum at \( Q \), and \( \sigma \) the number of seconds of angle in the maximum deflection, then it may be shown that

\[
y = \frac{v^2}{2}
\]

1 In the Philosophical Transactions for 1855 and 1859 will be found Airchensoff Pratt's calculations of the attractions of the Himalayas and the mountain region beyond them, and the consequent deflection of the plumb-line at various stations in India; the subject, which presents many anomalies and difficulties, is very fully taken up in his treatise on the figure of the earth. His computed deflections are vastly greater than anything brought to light by observation.
so that the number of seconds of time by which the maximum the pendulum is accelerated is about half the number of seconds of angle in the maximum deflection.

Principles of Calculation.

Let \( a, a' \) be the mutual azimuths of two points \( P, Q \) on a spheroid, \( k \) the chord line joining them, \( \mu, \mu' \) the angles made by the chord with the normals at \( P \) and \( Q, \phi, \phi' \) their latitudes and difference of longitude, and \( \frac{z'}{R} + \frac{z}{R} = 1 = 0 \) the equation of the surface; then if the plane \( z \) passes through \( P \) the co-ordinates of \( P \) and \( Q \) will be

\[
\begin{align*}
\alpha &= \frac{a}{\Delta} \cos \phi, \\
\alpha' &= \frac{a}{\Delta} \cos \phi' \cos \omega, \\
y &= 0, \\
y' &= \frac{a'}{\Delta} \cos \phi' \sin \omega, \\
z &= \frac{a}{(1 - e^2) \sin \phi}, \\
z' &= \frac{a'}{(1 - e^2) \sin \phi'},
\end{align*}
\]

where \( \Delta = (1 - e^2 \sin^2 \phi), \Delta' = (1 - e^2 \sin^2 \phi'), \) and \( e \) is the eccentricity. Let \( f, g, h \) be the direction cosines of the normal to that plane which contains the normal at \( P \) and the point \( Q, \) and whose inclinations to the meridian plane of \( P = a, \) let also \( l, m, n \) and \( I', m', n' \) be the direction cosines of the normal at \( P, \) and of the tangent to the surface at \( P \) which lies in the plane passing through \( Q, \) then since the first line is perpendicular to each of the other two and to the chord \( k, \) whose direction cosines are proportional to \( x - x', y - y', z - z', \) we have these three equations

\[
f (x - x') + gy' + hz' = 0, \\
f' + gy' + hz' = 0, \\
(f' + z')^2 + y'^2 + z'^2 = 0.
\]

Eliminate \( f, g, h \) from these equations, and substitute

\[
\begin{align*}
l &= \cos \phi \quad f - \sin \phi \cos \alpha, \\
m &= \sin \phi \quad f' + \sin \phi' \cos \alpha, \\
n &= \sin \phi \quad f' - \sin \phi' \cos \alpha,
\end{align*}
\]

and we get

\[
(x - x') \sin \phi + y' \cos \phi = 0
\]

The substitution of the values of \( x, x', y', z', z' \) in this equation will give immediately the value of cot \( \alpha, \) and if we put \( \zeta \) for the corresponding azimuths on a sphere, or on the supposition \( \varepsilon = 0, \) the following relations exist

\[
\begin{align*}
\cot \alpha &= \cot \zeta = \cos \phi \cos \alpha, \\
\cot \alpha' &= \cot \zeta' = \cos \phi' \cos \alpha', \\
\alpha' \sin \phi - \alpha \sin \phi' &= \alpha \sin \omega.
\end{align*}
\]

If from \( Q \) we let fall a perpendicular on the meridian plane of \( P, \) and from \( P \) let fall a perpendicular on the meridian plane of \( Q, \) then the following equations become geometrically evident.

\[
\begin{align*}
\kappa &= \sin \mu \sin a = \frac{d}{\Delta} \cos \phi \sin \omega, \\
\kappa &= \sin \mu' \sin a' = \frac{d}{\Delta} \cos \phi' \sin \omega.
\end{align*}
\]

Now in any surface \( \omega = 0, \) we have

\[
\begin{align*}
k^2 &= -(x - x')^2 + (y - y')^2 + (z - z')^2 \\
- \cos \mu &= \frac{(x - x') \frac{du}{dx} + (y - y') \frac{du}{dy} + (z - z') \frac{du}{dz}}{k} \\
\cos \mu' &= \frac{(x' - x') \frac{du}{dx} + (y' - y') \frac{du}{dy} + (z' - z') \frac{du}{dz}}{k}
\end{align*}
\]

in the present case, if we put

\[
\begin{align*}
1 - \frac{\omega}{\omega} &= \frac{2U}{U} = \frac{1}{b}, \\
-k^2 &= 2U - \frac{\omega}{\omega} (x - x')^2 \\
\cos \mu &= \frac{a}{b} \frac{1}{U}, \\
\cos \mu' &= \frac{a'}{b} \frac{1}{U}.
\end{align*}
\]

Let \( \omega \) be such an angle that

\[
(1 - e^2) \sin \phi = \Delta \sin \omega \\
\cos \phi = \Delta \cos \omega,
\]

then on expressing \( x, x', z \) in terms of \( u \) and \( u', \)

\[
U = 1 - \cos \cos \cos \omega = \sin \omega = \sin \omega',
\]

also, if \( \omega \) be the third side of a spherical triangle, of which two sides are \( \omega - \omega \) and \( \omega - \omega' \) and the included angle \( \omega, \) being a subsidiary angle \( \phi' \) such that

\[
\sin \phi \sin \frac{\omega}{2} = \sin \frac{\omega - \omega'}{2} \cos \omega + \frac{\omega - \omega'}{2},
\]

we obtain finally the following equations—

\[
\begin{align*}
h &= \sin \phi \sin \frac{\omega}{2}, \\
\cos \mu &= \frac{a}{b} \sin \phi \sin \frac{\omega}{2}, \\
\cos \mu' &= \frac{a'}{b} \sin \phi \sin \frac{\omega}{2}, \\
\sin \mu \sin \omega &= \frac{a}{b} \sin \omega \sin \omega, \\
\sin \mu' \sin \omega &= \frac{a'}{b} \sin \omega \sin \omega.
\end{align*}
\]

These determine rigorously the distance, and the mutual zenith distances and azimuths, of any two points on a sphere whose latitudes and difference of longitude are given.

By a series of reductions from the equations containing \( \zeta \) it may be shown that

\[
a + a' = \zeta + \frac{1}{4} (\phi' - \phi) \cos \phi' \sin \phi + \ldots
\]

where \( \phi \) is the mean of \( \phi \) and \( \phi', \) and the higher powers of \( \phi \) are neglected. A short computation will show that the small quantity on the right-hand side of this equation can never amount even to the tenth thousand part of a second, and practically speaking is zero; consequently the sum of the azimuths \( \alpha + \alpha' \) on the sphere is equal to the sum of the spherical azimuths, whence follows this very important theorem (known as Laplace's theorem). If \( \phi, \phi' \) be the latitudes of two points on the surface of a sphere, \( \omega \) their difference of longitude, \( \alpha, \alpha' \) their reciprocal azimuths,

\[
\tan \omega = \frac{\cos \phi \cos \phi'}{\cos \phi' \sin \phi + \ldots}
\]

The vertical plane at \( P \) passing through \( Q \) and the vertical plane at \( Q \) passing through \( P \) cut the surface of the sphere in two distinct curves. The greatest distance apart of these curves is, if \( \omega \) be the mean azimuth of \( PQ, \)

\[
\frac{z}{b} \cos \phi \sin \omega = A \omega.
\]

This is a very small quantity, for even in the case of a line of 100 miles in length having a mean azimuth \( \omega = 45^\circ \) in the latitude of Great Britain, it will only amount to half an inch, whilst for a line of fifty miles it cannot exceed the sixteenth part of an inch. The geodesic line joining \( P \) and \( Q \) lies wholly between these two curves. If we designate by \( P', Q' \) the two curves (the former being that in the vertical plane through \( P \)), then, neglecting quantities of the order \( \omega^2, \) where \( \omega \) is the angular distance of \( P \) and \( Q \) at the centre of the earth, the geodesic curve makes with \( \omega \) an angle equal to the angle it makes with \( Q \) at \( Q, \) each of these angles being a third of the angle of intersection of \( P \) and \( Q'. \) The difference of length of the geodesic line and either of the curves \( P, Q' \) is, \( \omega \) being the length of either,

\[
\frac{1}{b} \frac{\sin \omega}{\omega} \cos \phi \sin \omega = 2A
\]

At least this is an approximate expression. Supposing the angle \( PQ \) to be as much as \( 10^\circ, \) this quantity would be less than one hundredth of an inch

An idea of the course of a geodesic line may be gathered from the following example. Let the line be that joining Cadiz and St Petersburg, whose approximate positions are

<table>
<thead>
<tr>
<th>City</th>
<th>St Petersburg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lon.</td>
<td>6° 18' W.</td>
</tr>
<tr>
<td>Lat.</td>
<td>36° 22' N.</td>
</tr>
</tbody>
</table>

If \( G \) be the point on the geodesic corresponding to \( F \) on that one of the plane curves which contains the normal at Cadiz (by "corresponding" we mean that \( F \) and \( G \) are on a meridian) then \( G \) is to the north of \( F; \) at a quarter of the whole distance from Cadiz GF is 458 feet, at half the dis-

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1 See a paper "On the course of Geodesic Lines on the Earth's Surface" in the Philosophical Magazine for 1870.
The azimuth of a more important place is the azimuth

The azimuth of a more important place is the azimuth of the geodesic line at the intersection of the meridian line with the parallel of latitude. The azimuth of the geodesic line at the intersection of the meridian line with the parallel of latitude. The azimuth of a meridian line is always more important than the azimuth of any geodesic line.

If $\alpha$, $\beta$, and $\gamma$ be the angles made by the direction of $Z$ with the sides $AB$ or $AC$ of the first triangle, then, to find $\phi_1$, where the line cuts the next triangle, we must make the angles $F\beta, F\alpha, B\phi_1$, such that $\rho F\beta + \rho B\phi_1 = 180^\circ$. This fixes $P_1$, and $P_2$ is fixed by a repetition of the same process, so for $P_1, P_2, \ldots$. Now it is clear that the points $P_1, P_2, \ldots$ are connected by a chain of triangles, and for $P_1$, $P_2$, $P_3$, and $P_4$, the chain of triangles is continually continued.

From the relation we have given above, expressing the mutual relations of points $P$, $Q$, on a sphere, we may obtain the solution of the problem. Given the latitude $\phi$ of $P$, with the azimuth $\alpha$ and distance $s$ of $P$, to determine the latitude and longitude of $Q$ and the back azimuth $\alpha'$.

Let

$$\theta = \frac{s}{a}$$

and

$$\zeta = \frac{\phi - \alpha}{\sin s}$$

$\zeta$ is always a finite quantity even for the longest distances, then, putting $s = 90^\circ - \phi$,

$$\tan \frac{s'}{2} = \sin \left(\frac{\pi}{2} - \frac{s}{2}\right) = \frac{\sin \left(\frac{s}{2}\right)}{\cos \left(\frac{s}{2}\right)}$$

$$\tan \frac{\phi - \alpha}{2} = \sin \left(\frac{\phi - \alpha}{2}\right) = \frac{\sin \left(\phi - \alpha\right)}{\cos \left(\phi - \alpha\right)}$$

$$\phi - \alpha = s = \sin s' = \sin \left(\frac{\phi - \alpha}{2}\right)$$

Here $\rho$ is the radius of curvature of the meridian for the mean latitude $\phi + \phi'$. These formulæ are approximate only, but they are sufficiently precise even for very long distances.

Meridian Arcs.

The length of the arc of meridian between the latitudes $\phi_1$ and $\phi_2$ is

$$s = 2\pi r \rho = 2\pi \rho \phi_1 (1 - \rho^2 \sin^2 \phi_1)^{-\frac{1}{2}}$$

instead of using the excentricity, put the ratio of the arcs $= 1 - \rho^2 \sin^2 \phi_1$, then

$$s = 2\pi r \rho \frac{1 + n x (1 + n x - 1)^{-1}}{(1 + 2a \cos 2\pi + e^2)}$$

Thus, after integration, gives

$$\tan \left(\frac{\phi - \phi_1}{\phi_1}\right) = \tan \left(\frac{s}{a}\right)$$

The part of $s$ which depends on $n$ is very small, in fact, if we calculate it for the longest arc measured, the Russian arc, it amounts to only an inch and a half, therefore we omit this term, and put

$$s = \frac{(n + \frac{1}{4}) a}{2}$$

Now, if we suppose the observed latitudes to be affected with errors, and that the true latitudes are $\phi_1 + x_1$, $\phi_2 + x_2$, and if further we suppose that $n_1 + x$ is the true value of $\phi_1 + x_1$, and that $n_2$ is the true value of $\phi_2 + x_2$, and that $n_1$ and $n_2$ are not very far apart, and are connected by a line of long distance and reciprocal lengths.

The azimuth of a meridian line is always more important than the azimuth of any geodesic line.

In determining the figure of the earth from the arcs of meridian measured in different countries, one source of uncertainty was, until the last few years, the want of comparison between the standards of length in which the arcs were expressed. This has been removed by the very extensive series of comparisons recently made at Southampton (see Comparisons of Standard of Length of England, France, Belgium, Prussia, Russia, India, and Australia, made at the Ordnance Survey Office, Southampton, 1866, and a paper in the Philosophical Transactions for 1873, by Lt.-Col. A. R. Clarke, C.B., R.E., on the further comparisons of the standards of Austria, Spain, the United States, Cape of Good Hope, and Russia). These direct comparisons, which were carried out with the highest attainable precision, are of very great value. The length of the base has three independent determinations, viz., through the Russian standard, the French geoid, and the Belgian geoid, giving for the length of the base, expressed in terms of the standard yard of England.
The latitude assigned in this table to Saxanford is not the directly observed latitude, which is 60° 49' 35' 53", for there are here a cluster of three close latitudes which are astronomically determined, and if we transfer, by means of the geodetic connection, the latitude of *Girth of Sea* to Saxanford, we get 60° 49' 36' 59", and if we similarly transfer the latitude of *Baltic*, we get 60° 49' 35' 46". The mean of these three is that entered in the above table.

For the Indian arc in long. 77° 40' we have the following data.

<table>
<thead>
<tr>
<th>Station</th>
<th>Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Famine</td>
<td>5</td>
</tr>
<tr>
<td>Putchapoollam</td>
<td>10 59</td>
</tr>
<tr>
<td>Daddagoad</td>
<td>12 59</td>
</tr>
<tr>
<td>Namboated</td>
<td>15 59</td>
</tr>
<tr>
<td>Dungeronda</td>
<td>18 3</td>
</tr>
<tr>
<td>Takalheera</td>
<td>21 5</td>
</tr>
<tr>
<td>Kaliemper</td>
<td>24 7</td>
</tr>
<tr>
<td>Kaliama</td>
<td>29 30</td>
</tr>
</tbody>
</table>

The data of the Russian arc (long. 26° 40') taken from M. Struve's work are as below:

<table>
<thead>
<tr>
<th>Station</th>
<th>Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staro Nizhnutova</td>
<td>45 29</td>
</tr>
<tr>
<td>Volgagou</td>
<td>51 7</td>
</tr>
<tr>
<td>Asmodeikow</td>
<td>15 26</td>
</tr>
<tr>
<td>Kremenets</td>
<td>50 50</td>
</tr>
<tr>
<td>Belou</td>
<td>52 2</td>
</tr>
<tr>
<td>Neuensch</td>
<td>54 30</td>
</tr>
<tr>
<td>Jacobstadt</td>
<td>56 30</td>
</tr>
<tr>
<td>Dorpat</td>
<td>58 23</td>
</tr>
<tr>
<td>Holgand</td>
<td>60 0</td>
</tr>
<tr>
<td>Kimber</td>
<td>62 35</td>
</tr>
<tr>
<td>Toness</td>
<td>65 49</td>
</tr>
<tr>
<td>Stuor-ovnl.</td>
<td>68 49</td>
</tr>
<tr>
<td>Fuglenes</td>
<td>79 12</td>
</tr>
</tbody>
</table>

From the arc measured by Sir Thomas Macleod in long. 18° 30', we have

<table>
<thead>
<tr>
<th>Station</th>
<th>Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Eend.</td>
<td>24 9</td>
</tr>
<tr>
<td>Heerenlogenest Berg</td>
<td>51 58</td>
</tr>
<tr>
<td>Royal Observatory</td>
<td>33 58</td>
</tr>
<tr>
<td>Zwart Kop</td>
<td>12 39</td>
</tr>
<tr>
<td>Cape Point.</td>
<td>34 21</td>
</tr>
</tbody>
</table>

And, finally, for the Peruvian arc, in long. 281° 0', we have

<table>
<thead>
<tr>
<th>Station</th>
<th>Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tarqu</td>
<td>3 3</td>
</tr>
<tr>
<td>Cotchepuy</td>
<td>0 2</td>
</tr>
</tbody>
</table>

Having now stated the data of the problem, we may either seek that ellipsoid which best represents the observations, or we may restrict the figure to one of revolution. It will be convenient to commence with the assumption of an ellipsoidal figure, as on so doing we can, by a slight alteration in the equations of minimum, obtain also the required figure of revolution. It may be remarked that, whatever the real figure may be, it is certain that if we presuppose it an ellipsoid, the arithmetical process will bring out an ellipsoid, which ellipsoid will agree better with all the observed latitudes than any spheroid would, therefore we do not prove that it is an ellipsoid; to prove this, arcs of longitude would be required. There is no doubt such arcs will be shortly forthcoming, but as yet they are not available.

The first thing that occurs to one in considering an ellipsoidal earth is the question, What is a meridian curve? It may be defined in different ways: a point moving on the surface in the direction astronoanically determined as "north" might be said to trace a meridian; or we may define it as the locus of those points which have a constant longitude, whose zeniths lie in a great circle of the heavens, having its poles in the equator; we adopt this definition. Let \( a, b, c \) be the semiaxes, \( c \) being the polar semiaxis.

The equation of the ellipsoid being

\[
\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1.
\]

If \( P \) be any point on the surface, the direction cosines of the normal at \( P \) are proportional to...
and if \( \frac{1}{2} \pi - \phi \) be the angle between this normal and the minor axis, so that \( \phi \) is the latitude of \( P \), we have

\[
\sin \phi = \frac{z}{\sqrt{a^2 - x^2 + y^2}}.
\]

Hence the equation to a "parallel" in which the latitude \( \phi \) is constant is

\[
x^2 + y^2 + \frac{z^2}{a^2 - \cos^2 \phi} = \frac{a^2}{a^2 - \cos^2 \phi}.
\]

So that in an ellipsoidal earth the parallel is no longer a plane curve. Let longitude be reckoned from the plane of \( xz \). As there are two species of latitude, astronomical and geocentric, so there are in the ellipsoidal earth two species of longitude, geocentric (called \( w \)) and astronomical (called \( \omega \)). Conceive a line passing through the origin in the plane of the equator and directed to a point whose longitude is \( \frac{1}{2} \pi + \omega \). The direction cosines of that line are \(-\sin \omega, \cos \omega, 0\). Those points of the surface whose normals are at right angles to this line are in the meridian whose longitude is \( \omega \), the condition of perpendicularity is expressed by

\[
\sin \omega + y \cos \omega = 0,
\]

and thus, in fact, is the equation of the meridian, which is still on the ellipsoidal hypothesis a plane curve. The geocentric and astronomical longitudes are connected by the relation

\[
a^2 \tan \frac{\omega}{2} = b^2 \tan \omega.
\]

This meridian curve is an ellipse whose minor semi-axis is \( c \), and of which the semi-major axis is some quantity \( r \) intermediate between \( a \) and \( b \), such that

\[
1 - \frac{\cos^2 \omega}{a^2} = \left(1 - \frac{\cos^2 \omega}{b^2}\right) \cdot \frac{\cos^2 \omega}{b^2}.
\]

Take two quantities \( u, v \), such that \( a(1-u)=b(1+v)=k^2 \), then

\[
\frac{u}{1-u} = \frac{1}{1+v}.
\]

and substitute the value of \( r \), neglecting the square of \( s \), this gives

\[
\frac{u}{1-u} = \frac{1}{1+v} = \frac{4}{k^2}.
\]

Now we have to determine not only the three semi-axes \( a, b, c \), but the longitude of \( P \). Let \( \alpha \) be the longitude of one of the measured meridian arcs, \( \beta \) the longitude of another, then for that arc,

\[
\frac{u}{1-u} = \frac{1}{1+v} = \frac{4}{k^2}.
\]

where \( 4p = \cos 2\alpha + \sin 2\alpha \), \( 4p = \sin 2\beta \).

The normal at \( P \) does not pass through the axis of rotation, so that the observed latitudes on an ellipsoid are not exactly the quantities which should be used in the ordinary method of expressing the length of a meridian arc in terms of the latitudes. But it may be shown that this consideration may be neglected.

The data we have collected form 35 equations between the 40 z-corrections to the observed latitudes, and the four unknown quantities determining the elements of the ellipsoid. Suppose \( m_t \) to be an approximate value of the ratio \( k - c : k + c \), so that

\[
k - c : k + c = m_t + r,
\]

where \( r \) is a small correction to \( m_t \), and suppose \( c_2 \) to be an approximate value of \( c \) so that \( c = c_1 (1 + t) \), then the four unknown quantities are \( p, q, r, t \). The result of making the sum of the squares of the 40 corrections a minimum is

\[
a = 20956350 = 6378140 \quad b = 20919773 = 6378140 \quad c = 63560681
\]

The meridian of the greater axis passes, in the Eastern Hemisphere, through Spitzbergen, the Straits of Messina, Lake Chad in North Africa, and along the west coast of South America, nearly corresponding to the meridian which passes over the greatest quantity of land in that hemisphere. In the Western Hemisphere it passes through Behring's Straits and through the centre of the Pacific Ocean. The meridian (105° 34' E) of the minor axis of the equator passes near North-east Cape on the Arctic Sea, through Tongking and the Straits of Sundra, and corresponds nearly to the meridian which passes over the greatest amount of land in Asia, and in the Western Hemisphere it passes through South Sound, the west of Labrador, Montreal, between Cuba and Hayti, and along the west coast of South America, nearly coinciding with the meridian which passes over the greatest amount of land in that hemisphere.

The length of the meridian quadrant passing through Paris, in the ellipsoidal figure given above, is 10001472.5 metres, showing that the length of the ideal French standard is considerably in error as representing the ten-millionth part of the quadrant. The minimum quadrant, in longitude 105° 34', has a length of 10000516.5 metres. The probable error of the longitude of the major axis of the equator given above is of course large, as much perhaps as 15'.

It has been objected to this figure of three unequal axes that it does not satisfy, in the proportions of the axes, the conditions brought out in Jacobi's theorem. Admitting this, it has to be noted, on the other hand, that Jacobi's theorem contemplates a homogeneous fluid, and this is certainly far from the actual condition of our globe, indeed the irregular distribution of continents and oceans suggests as possible a sensible divergence from a perfect surface of revolution.

If we limit the figure to be an ellipsoid of revolution, we get rid of our equations of two unknown quantities, and the result may be expressed thus

\[
\frac{a - c}{a + c} = \frac{b - c}{b + c} = \frac{1}{2} = \frac{1}{2}.
\]

As might be expected, the sum of the squares of the 40 latitude corrections, viz., 153,99, is greater in this figure than in that of three axes, where it amounts to 138.30. In the Indian arc the largest corrections are at Dodagounth, +3° 87', and at Kalaupur, -3° 68'. In the Russian arc the largest corrections are +3° 77', at Tornera, and -3° 31', at Staro Nekrasowska. Of the whole 40 corrections, 16 are under 1° 0', 10 between 1° 0' and 2° 0', 10 between 2° 0' and 3° 0, and 4 over 3° 0. For the ellipsoidal figure the probable error of an observed latitude is \( 1° 42' \); for the spherical it would be very slightly larger. This quantity may be taken therefore as approximately the probable amount of local deflection.

In 1863, the Russian Government, at the instance of M. Otto Struve, imperial astronomer at St. Petersburg, invited the co-operation of the Governments of Prussia, Belgium, France, and England, to the important end of connecting their respective triangulations so as to form a continuous chain under the parallel of 52° from the island of Valaia on the south-west coast of Ireland, in longitude 10° 20' 40" W, to Omk on the river Ural in Russia. This grand undertaking was at once set in action, but up to the present
time there are portions of the work still incomplete. On
the part of England the triangulation was, in 1862, carried
through France into Belgium; and the difference of
longitudes of Greenwich and Valletta was determined by
the Astronomer Royal by means of electric telegraph signals.

Although in theory the determination of differences of
longitudes by electric telegraph signals may appear extremely
simple, yet practically there are very many sources of error
which have to be sought out and eliminated by a proper
arrangement of the observations. The system has now
been brought to such perfection that the astronomical
accuracy of arcs of longitude can be determined with
nearly as much accuracy as the figure of latitude, and in a few
years the data of the problem of the figure of the earth will
thus receive many additions. As an example of the
precision arrived at, the difference of longitude of Green-
wich Observatory and Harvard Observatory, U.S.A., has
been three times determined with the following results :-

<table>
<thead>
<tr>
<th>Year</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1866</td>
<td>4 44 31 00</td>
</tr>
<tr>
<td>1870</td>
<td>4 44 30 99</td>
</tr>
<tr>
<td>1872</td>
<td>4 44 33 96</td>
</tr>
</tbody>
</table>

But the different determinations of the velocity of
transmission of signals present great anomalies.

**Pendulum Observations.**

In Clairaut's theorem we have seen that if $g'$ be gravity
in the latitude of $\phi$, $g$ its value at the equator, then
$g = g(1 + q \sin^2 \phi)$. If the same pendulum be swung in
different latitudes than the square of the number of
vibrations will be proportional to gravity. Hence, if $N$ be
the number of vibrations of an invariable pendulum per
diem at the equator, $N'$ the number in latitude $\phi$, then
$N'^2 = N^2(1 + q \sin^2 \phi)$. Thus $g$ can be obtained by observa-
tions on the same pendulum in different latitudes, and since
$q = \frac{\sin \phi}{\sin \phi'} - 1$ and $\phi$ is known, $g$ will at once, follow. The
pendulum which makes 86400 oscillations per diem in London
is observed to lose 136 vibrations at the equator and
gain 79 at Spitzbergen.

The limits of space at our disposal here prevent our going
into the subject of pendulum experiments, and it seems
unnecessary to repeat the investigations that have
already been based upon the older pendulum observations.

See Airy's *Figure of the Earth*, Baily's paper in the
Memoirs of the Royal Astronomical Society, General
Sabine's Account of Experiments to determine the Figure
of the Earth by means of the Pendulum vibrating seconds in
Different Latitudes, 1825, and a valuable paper in the
Cambridge Philosophical Transactions, 1849, by Professor
Stokes. The pendulum gives an ellipticity certainly some-
what greater than that resulting from arcs of meridian,

\[ \text{V} = \frac{1 - \cos \theta}{\cos \theta} \]

An immense number of pendulum observations are now being made at the astronomical stations of
goodscale surveys in Germany, Russia, and India, which,
when fully published, will throw light more perhaps upon
the local variations of gravity than on the figure of the
earth. The observations made at the various stations of
the Indian meridian are being light a physical fact of the
very highest importance and interest, namely, that the
density of the strata of the earth's crust under and in the
vicinity of the Himalayan Mountains is less than that
under the plains to the south, the deficiency increasing as
the stations of observation approach the Himalayas, and
being a maximum when they are situated on the range
itself. This accounts for the non-appearance of the large
deflections which the Himalayas, according to Archedeacan,
Fratt's calculations, ought to produce. The Indian
pendulum observations also throw some light on the relative
variations of gravity at continental, coast, and island
stations, showing that, without a single exception, gravity
at the coast stations is greater than at the corresponding
continental stations, and greater at island stations than
at coast stations. The ellipticity of the earth has also
been deduced from the motion of the moon, the quantity
$1 - \frac{1}{e^2}$ entering as a coefficient in the expression for
the moon's latitude. The resulting value of the ellipticity is
3.504 (Airy's True, p. 395). A value of the ellipticity
may also be derived from the precession of the equinoxes,
but this depends on the assumed law of density in the
interior of the earth it is not of much importance.

**Elements of the Figure as a Solid of Revolution.**

If $a$ be the radius of curvature of the meridian in latitude $\phi$, $\phi'$
that perpendicular to the meridian, $D$ the length of a degree of the
meridian, $D'$ the length of a degree of longitude, $r$ the radius drawn
downward from the centre of the earth, $\psi$ the angle of the vertical, then

\[ \begin{align*}
\psi &= \frac{20990500 - 1064115 \cos 2a + 225 \cos 4a}{0.13485 - 95.8 \cos 2a + 139.8 \cos 4a} \\
D &= \frac{384609 - 1857 \cos 2a + 394 \cos 4a}{0.13485 - 95.8 \cos 2a + 139.8 \cos 4a} \\
D' &= \frac{385538 - 48 \cos \phi - 310 \cos 2a + 253 \cos 5a}{0.13485 - 95.8 \cos 2a + 139.8 \cos 5a} \\
\psi &= \frac{9 9996245 - 11000284 \cos 2a - 8000109 \cos 4a}{0.13485 - 95.8 \cos 2a + 139.8 \cos 4a} \\
\psi &= \frac{7004 \sin 2a \cos 25 \pi}{0.13485 - 95.8 \cos 2a + 139.8 \cos 4a}.
\end{align*} \]

In this country, the earliest work worthy of mention is Dr. Robert Hooke’s *Discourse on
Earthquakes*, written in 1668, and read at a later date
before the Royal Society. This discourse, though containing
many passages of considerable merit, tended but little to
a correct interpretation of the phenomena in question.

In this country, the earliest work

\[ \psi = \frac{99996245 - 11000284 \cos 2a - 8000109 \cos 4a}{0.13485 - 95.8 \cos 2a + 139.8 \cos 4a} \]

\[ \psi = \frac{7004 \sin 2a \cos 25 \pi}{0.13485 - 95.8 \cos 2a + 139.8 \cos 4a} \]

\[ \psi = \frac{99996245 - 11000284 \cos 2a - 8000109 \cos 4a}{0.13485 - 95.8 \cos 2a + 139.8 \cos 4a} \]

\[ \psi = \frac{7004 \sin 2a \cos 25 \pi}{0.13485 - 95.8 \cos 2a + 139.8 \cos 4a} \]

\[ \psi = \frac{99996245 - 11000284 \cos 2a - 8000109 \cos 4a}{0.13485 - 95.8 \cos 2a + 139.8 \cos 4a} \]

\[ \psi = \frac{7004 \sin 2a \cos 25 \pi}{0.13485 - 95.8 \cos 2a + 139.8 \cos 4a} \]

\[ \psi = \frac{99996245 - 11000284 \cos 2a - 8000109 \cos 4a}{0.13485 - 95.8 \cos 2a + 139.8 \cos 4a} \]

\[ \psi = \frac{7004 \sin 2a \cos 25 \pi}{0.13485 - 95.8 \cos 2a + 139.8 \cos 4a} \]
His illustration of the movement of the ground is that of a loose carpet thrown into undulations by being shaken at one corner. Although Michell's hypothesis is still accepted, in a modified form, by some geologists, it should be remembered that many arguments of considerable weight have been urged by modern physicists against the doctrine of a liquid nucleus and a thin crust. Whatever the merits of Michell's theory, he failed to understand the true nature of wave-motion, and the way in which it is transmitted during an earthquake shock. Modern seismologists believe that an earthquake is a vibratory motion propagated through the solid materials of the earth, much in the same way that sound is propagated by vibrations in the atmosphere. It appears that this view was first suggested by Dr Thomas Young in his Lectures on Natural Philosophy, published in 1807. The development of this view, especially in its quantitative results, lies at the very base of seismology.

In 1846 Mr Mallet communicated to the Royal Irish Academy his first paper "On the Dynamics of Earthquakes," and in the following year the late Mr Hopkins, of Cambridge, presented to the British Association a valuable report in which earthquake-phenomena are discussed in some detail. Since that date the great advances in this country have been made by Mr Mallet, assisted occasionally by the Rev. Professor Haughton and other mathematicians.

Even at the present day, after all that has been written on the subject, but little is really known as to the origin of earthquakes. Probably several distinct causes should be recognized, for it is hardly to be supposed that all subterranean disturbances, differing as they do so widely in intensity and in duration, should be referable to one common mechanism. Any great concussion, even upon the surface, is competent to produce tremors which may be regarded as diminutive earthquakes; thus the great land-slip at the Rossberg in Switzerland in 1806 was accompanied by a local quaking of the ground. Volger and Mohr have suggested that some of the small earthquakes which have been felt in Germany may be referred to the falling-in of the roof of enormous subterranean cavities formed by the long-continued solvent action of water on deposits of rock-salt, limestones, and gypsum. Such causes, however, can have given rise to only very petty shocks, and must be quite subordinate to subterranean disturbances of a more general character. The late Mr Poullart Scrope was led to refer most earthquakes to "the snap and jar occasioned by the sudden and violent rupture of solid rock-masses, and perhaps the instantaneous injection into them of intumescent molten matter from beneath." He believed that the rupture of the rocks was due to expansion of deeply seated masses of mineral matter, consequent upon either increased temperature or diminished temperatures. It is argued, however, by Mr Mallet, on mechanical principles, that such fractures could produce only very weak impulses; but he believes that some earthquakes, especially those marked by long continued tremors, may be due to the movement and crushing of rock masses by tangential pressures produced by secular cooling of the earth. Steam has always been a favourite agent with seismologists, since it is clearly competent to produce great effects by its sudden generation or by its sudden condensation. It has been suggested that water, finding its way through fissures in the earth's crust, might reach the heated rocks in a vapourous or subaqueous condition, until a local reduction of temperature suddenly caused it to flash into steam. After all, the origin of earthquakes is probably to be regarded as part only of a much wider question. Whatever causes are competent to produce volcanic action are, in all likelihood, equally competent to produce the ordinary manifestations of seismic energy. A relation is clearly traceable between the geographical distribution of volcanoes and the chief earthquake-areas, and although it is not for a moment to be supposed that the volcano and the earthquake stand to each other in the relation of cause and effect, it is nevertheless highly probable that they represent merely different expressions of the same subterranean forces.

Whatever may be the real origin of the earthquake shock, it is convenient to regard its effects as proceeding from a concussion or sudden blow delivered underground at some definite centre. This centre of impulse is called the "seismic focus." It must be borne in mind, however, that such a centre, so far from being anything like a mathematical point, is in nature a subterranean region, which in many cases is no doubt of very large dimensions, measuring perhaps some miles in diameter.

From the seismic centre waves are propagated in all directions through the solid materials of the earth's crust, and if the focus be situated beneath the sea, the vibrations of the ground will be accompanied by undulations of the water. Those waves which pass through the elastic materials of the earth consist of two parts, of longitudinal vibrations, like those of atmospheric sound-waves, and consequently not like ordinary water-waves. In the sound-wave the air is alternately condensed and rarefied, the molecules advancing and retreating in the line of direction in which the wave is travelling. In the water, on the contrary, the molecules of liquid rise and fall, or rather describe closed curves in planes which are transverse to the direction in which the undulation or wave-form advances. According to Mr Hopkins, both orders of vibration—longitudinal and transverse—occur in the earth-quake-wave, and call for investigation. When, for example, the molecules of an iron bar are disturbed by a blow delivered at one end, both kinds of vibration are generally excited, and hence two waves are sent through the bar,—the longitudinal, however, having a much greater velocity than the transverse wave. But it may be doubted whether the seismologist need concern himself with any but longitudinal vibrations.

For, admitting that small transversal vibrations are generated at the seismic focus, it is probable that they would be cut off at a great extent during transmission from stratum to stratum. Indeed, the planes of junction between the several beds of stratified deposits would hinder the transmission of transversal vibrations travelling in a direction normal to the strata. Hence Mr Mallet maintains, that in studying the effects of an earthquake, attention may be usually, without danger of error, confined to the longitudinal or normal vibrations, the transversal or tangential vibrations being neglected.

Around the seismic centre, or mean focal point, the molecules of the rock will first be squeezed together by the concussion, and then separated by virtue of the elasticity of the solid medium, the onward motion is then rapidly taken up by the next set of molecules, which in like manner are pushed against one another, and then spring apart. In this way the pulse, or form of the wave, may be propagated to an enormous distance, whilst the excursions of the individual particles are confined within very narrow limits. It is therefore of great importance to distinguish between the transit of the wave and the movement of the material particles. Each molecule may move only through a few inches, but the undulation may travel for hundreds of miles. The distance through which the individual particles oscillate is called the amplitude of the wave. After the Neapolitan earthquake of 1857 Mr Mallet found from actual observation at a place called Polia, situated nearly above the seismic centre, that the amplitude of a wave which continued for some 2½ miles was less than an inch. He is thus led to believe, contrary to the opinion of most geologists, that earthquakes are not great agents of...
permanent elevation. That elevation has been frequently observed after an earthquake is a fact beyond question; thus, Captain Fitzroy found, after the South American earthquake of 1855, that a part of the isle of Santa Marta in the Bay of Concepcion, had been raised upwards of 10 feet, and, although this elevation was followed by a slow subsidence, it is believed that the land was permanently lifted considerably higher than its level before the occurrence of the catastrophe. Mr Mallet, however, would prefer such alteration of level to the action of elevatory forces accompanying the earthquake, but not to the direct transit of the earth-wave.

From the density and the modulus of elasticity of a given rock, it is possible to calculate the velocity with which a vibration would travel through such a medium. But the rate deduced by calculation usually exceeds very greatly that actually observed in an earthquake. To determine the rate of transit through various rocks, Mr Mallet and his son Dr J. W. Mallet conducted many years ago a series of experiments, at the instance of the British Association. A mile was carefully levelled and measured on sand in Killiney Bay, near Dublin, and by explosion of gunpowder the velocity of transmission through this damp sand was observed. This sand was selected as a medium likely to give a minimum velocity, whilst an assumed maximum velocity was observed by experiments on the granite of Killiney Hill. The velocity in sand was about 825 feet, and in solid granite 1665 feet per second. These figures are much lower than those obtained from theoretical considerations, and it is believed that the difference is due to loss of speed occasioned by the discontinuity of the rock, even the solid granite being always more or less affected by fomentation. The velocity deduced from these experiments accords tolerably well, however, with that observed during earthquake-shocks. Thus the velocity of shock during the Lisbon earthquake of 1755 is computed to have been about 20 miles per minute, or 1760 feet per second. This velocity of the earth-wave, or wave of shock, is of course to be carefully distinguished from the velocity of the oscillating particles. The mischief of the shock depends in fact on the rate at which the earth-molecules are moving, and this is vastly inferior to that of the wave. Thus Mr Mallet calculated from his observations in Naples that the shock of the great earthquake of 857 had a mean velocity in the surface of 788 feet per second, whilst the greatest velocity of the wave-particles was never more than 15 feet per second, and in many places was very much less. Yet this low velocity is quite sufficient to produce effects of the most disastrous kind upon solid objects exposed to the shock.

If the earth were a homogeneous solid, perfectly isotropic — that is to say, possessing equal elasticity in all directions — the waves of alternate compression and expansion would take the form of a series of concentric spherical shells around the seismic focus as a common centre. As a matter of fact, however, the crust of the earth is made up of rocks varying greatly in physical properties, each having its own density and elasticity, whilst the rocks themselves are fissured in all directions. Symmetry of wave-surface is therefore hardly to be expected; for the waves will necessarily have greater velocity in one direction than in another, whilst the transit of the wave may be interrupted by breach of continuity in the transmitting medium. The points at which a wave-shell reaches the surface form a curve which is conveniently called a coseismic line. It is obviously the line along which an earthquake shock will be simultaneously felt, and where the waves will emerge at the same angle. Since the wave-shells are not concentric spheres, the coseismic curves cannot be concentric circles.

It may readily be supposed that the greatest effect of an earthquake, at least in shaking a building up and down, will be felt at that point of the surface which is situated vertically over the centre of impulse. A line joining this point with the earthquake-focus is termed the coseismic vertical, and the wave travelling to the surface along this vertical has a shorter path than that of a wave emerging at any other point. Just as the seismic focus is, in nature, not a single point, but a considerable space, so the seismic vertical is not a single line, but rather a succession of parallel lines drawn from every point of the focal area to the surface. The mean of these lines may be taken as the seismic vertical. In the neighbourhood of this line the waves emerge at very steep angles, and indeed for a considerable area may be regarded as practically vertical in direction. As the distance from the seismic vertical increases, the angle of emergence becomes less and less; but it is evident that since the focus is seated beneath the surface, the path of an emergent wave can never be perfectly horizontal, unless indeed it be that of a reflected wave.

Almost any object which has been overthrown or projected by an earthquake-shock may afford direct information as to the path of the wave on the surface. For when the vibration is transmitted to such a solid body as an upright column, the particles are pushed together and then pulled apart in the line of wave-transit. It is clear that only half the energy of the wave can be propagated in the same direction as that in which the wave is travelling, and half in the opposite direction. Each particle of the object when first disturbed moves with the wave, and its velocity increases from zero to the maximum, this maximum being reached at one quarter of the total vibration; then the velocity diminishes from the maximum to zero, which it attains at the end of half the oscillation. During this first semi-phase, therefore, the vibration has been in the direction in which the wave moves. After the first half oscillation has been executed, movement begins afresh, but this time in the contrary direction, attaining its maximum at the end of the third quarter, and then falling again to zero when the vibration is completed. Hence during the first semi-phase, the motion of the particles is in the same sense or direction as that of the wave, and during the second semi-phase in the opposite direction. But in consequence of the inertia of the body its apparent movement if free, will be in a direction contrary to that of the wave during the first semi-phase. Whatever the direction of the shock, however, it will always be in the line of wave-transit. Hence the azimuthal direction of the wave is easily found.

Whenever any two wave-paths, not in the same right line, can be thus traced on the surface, the position of the seismic vertical may be immediately determined. For thus line must pass through the point of their intersection. If, for example, it is found by observation on bodies displaced by the shock that one wave moved in the direction AB (Fig. 1), whilst another had a path CA (Fig. 1), it is only necessary to mark on the surface the point O, at which these azimuths meet, and the seismic focus will be vertically beneath such a point. The point indicates, in fact, the centre on the surface from which the waves radiated. Practically it is found that the several wave-paths of an earthquake do not diverge from a single point, for reasons already indicated; but intersections are less and less, and the paths are crowded together in the neighbourhood of the mean vertical. It is easy to understand that the greatest amount of mechanical damage is not to be expected immediately above the focus, although this is the point nearest to the origin of impulse. It is true, the shock passing directly upwards along the seismic vertical might destroy the roof or floor of a building, but it would not tend directly to overturn the walls or produce lateral disturbance. In fact, the side-thrust will be greatest in waves which reach the surface at small angles, and are therefore necessarily at great distances from the seismic vertical. But the energy of the wave diminishes as the square of the distance along the normal increases. Hence there must be some definite position upon the surface beyond which advantage of direction is counteracted by loss of energy. Indeed it is generally possible after an earthquake to trace the successive zones of objects may be regarded as practically the same are known as "seismic curves". After what has been already said, it is hardly necessary to remark that these lines are not true circles, nor indeed are they in all cases regular closed curves.

Fig. 1.
Fractures and fissures in walls which have been rent by an earthquake, are of great value to the seismologist, since they often indicate the direction in which the waves emerge at the surface. The interpretation of such phenomena, in some cases very complicated, has been ably discussed by Mr Mallet, who applied the results with excellent effect to his observations on the Neapolitan earthquake. If it is possible to find, from such indications, the direction in which any two waves emerged at the surface, the depth of the seismic focus is easily determined. For since the waves radiate from this focus, any two wave-paths when produced backwards will meet at the seismic centre. It has already been shown that the verticals are so situated that, when this is known the direction of the focus is determined, for as the verticals represent one wave path it is necessary to find only one other. Let O (fig 2) be the seismic focus, and OA the seismic vertical, if a

**Fig 2.**

wave, OB, emerge at the surface B, at an angle θ, it is evident that

$$AO = AB \tan \theta$$

To find the depth of the focus, it is consequently only necessary to know the angle of emergence of a wave at a given station, and the distance of this station from the seismic vertical. As the stations are so situated that, for each other, the earth's sphericity may be neglected, and the surface between the two regarded as practically a horizontal plane,

where several wave-paths are known, several values of AO will be obtained, and as the seismic centre is not a point, like O, but a cavity of determinate magnitude, the average of these different values must be taken to represent the mean focal depth. After the great Neapolitan earthquake of 1857, Mr Mallet, aided by the Royal Society, spent months in carefully examining the country which had been rent by the shock, and in 1852 he published an elaborate report in which his observations were fully discussed. By determining the wave-paths at twenty-five stations in every azimuth around the seismic vertical, he was enabled to deduce the important fact that the mean focal depth of the earthquake was about 12 geographical miles. Similar principles have since been applied by Dr Oldham to an examination of the results of an earthquake which occurred in Cachar in India, on January 10, 1869, and he has found that the seismic focus must have had a depth of about 30 miles.

Between the centre of disturbance and the seat of the shock, as appears to have been the case with that which produced the great earthquake of Lisbon in 1755, a water-wave is generated, but since this has less velocity than the earth-wave, it does not roll up upon the shore until after the shock has been felt on land. The height of the sea-wave depends on the depth of the water. During the Lisbon earthquake the wave at Cadiz was as much as sixty feet in height. It is this great sea-wave which, breaking upon the shore after the earthquake-shock, generally completes the work of devastation. At first the water retires from the land, but in a few moments the gigantic wave rolls in, and sweeps all before it.

The earthquakes which are so frequently felt on the western coast of South America are generally terminated in this manner, and the great tube wave which accompanied the earthquake of May 1877, wrought dreadful havoc at Arica, Iquique, and other towns on the coast. In addition to the waves propagated through earth and sea, it commonly happens that waves are transmitted through the air and thus produce sound. These sound-waves, travelling at the rate of about 1100 feet per second, may reach the observer nearer simultaneously with the shock or before it or even after it. They probably result from sudden fracture and dislocation of rock-masses, or from subterranean explosions.

Almost every object disturbed by an earthquake may be made to yield, when properly questioned, more or less information with respect to the direction and intensity of shock. Special instruments termed seismometers, however, have been constructed for this purpose, and have assumed considerable variety of form. Perhaps the simplest seismometer is that suggested by Mr Babbage, consisting merely of a bowl of some vessel liquid like treacle. On the passage of a shock the liquid rises up one side of the vessel, leaving its mark to indicate radially the direction and extent of motion. As a modification of this simple instrument Mr Mallet proposed the use of a common wooden tub having its inside rubbed with chalk, and half filled with coloured water. An apparatus devised by Professor Cescutore, of Palermo, and much used in Italy, is constructed with a shallow dish having eight notches in the side, and containing mercury up to the level of the lip. When any oscillation occurs, the liquid is split into a series of caps placed under the notches, and the quantity ejected, which may be readily weighed, gives some notion of the intensity of the shock. Since the notches face the four cardinal points and bisecting rhumbs, the direction in azimuth is approximately obtained. Mr Mallet suggested a convenient form of seismometer in the shape of a tube, the cavity of which is filled with mercury, and the horizontal limb directed to the cardinal points. The tube is partially filled with mercury, and the horizontal component of any shock causes the mercury to move in the lower limb, whilst the vertical component is determined by the motion of quicksilver in a U-shaped tube. In both cases, the movement of the liquid column is registered by means of indexers.

All these instruments depend for their indications on the displacement of liquids by the shock of the earthquake. But it is obvious that the oscillations of solid bodies may be equally well employed in seismometry. Thus a pendulum free to move in all directions will be set vibrating by a shock, and may be made to record the direction and extent of its vibration by means of a style below the bob, which moves over a bed of fine sand in a properly-shaped dish. Two pendulums are sometimes used, as proposed by Santu. One pendulum vibrates in a vertical plane directed north and south, and the other in one striking east and west. The axes traced by these styles are registered by means of a tracing-stile affixed to the bob. Professor J. Forbes employed an inverting pendulum, or rod fixed at its base and weighted above, carrying at its free end a pencil or tracer by which any oscillation could be recorded. A modification of the inverting pendulum was devised by Mr Mallet, and described in 1849. Both the horizontal and the vertical element of a shock are recorded by the movement of mercury in a system of glass tubes, the tubes being placed in a galvanic circuit so arranged that contact is broken by displacement of the liquid. As long as the circuit remains complete, a pencil traces a line on ruled paper wound round a cylinder rotated by clock-work, but the motion of the mercury intercepts the current and thus breaks the line. Two forms of "ball seismometer" are also due to the ingenuity of the investigator. In one of these instruments, two heavy metal balls are placed on slightly inclined planes supported by a cast-iron table, the axis of which passes through a vertical
spiral spring. During the passage of an earthquake wave the spring is compressed and the balls displaced,—their displacement breaking contact in an electric circuit which had previously been completed through the balls. That ball which first moves gives the time at which the shock commences, whilst the other gives the elements of the shock. Two such instruments are necessary to form one seismometer, the two being placed at right angles to each other.

An elaborate electro-magnetise seismograph has been constructed by Professor Palmeri, and has done good service in the observatory on Mount Vesuvius. The vertical movements are recorded by a helix of copper wire, the lower end of which is caused by even the slightest shock to dip into a basin of mercury, and thus complete a galvanic circuit. An electro-magnet, brought into action when the connections are completed, strikes an alarm bell which calls an attendant, and also stops a clock, so that the instant at which the shock occurs is permanently marked. At the same time a second electro-magnet releases the pendulum of another clock, which being thus set in motion unrolls a band of paper, while a pencil continues to mark upon the paper as long as the shock lasts. To record the vertical element a system of four U-shaped tubes is employed, the same being partly filled with mercury, and any displacement breaking contact being placed at right angles to each other.

Fig. 3

Two sets of right cylinders are turned to fig. 3. Two such instruments connected with an index. The shock lasts to record the vertical displacement breaking contact which is caused by even the slightest shock to overtop No. 3 standmg; then the shock commences by connecting the narrow-based pillar with the pendulum of a clock so as to stop it at the instant of overthrow. Where the angle of wave-emergence is very steep, this instrument is not to be recommended, since it ignores the vertical element of the shock.

Catalogues of earthquakes, showing their distribution in time and space, have been constructed by Mallet, Perrey, Von Hoff, Cotte, and other seismologists. The most complete of these statistical works is the catalogue arranged compiled by Mr. R. Mallet and his son, Dr. J. W. Mallet, and published by the British Association between the years 1854 and 1858. This includes notices of all recorded earthquakes from 1608 a. d. to 1842 a. d. and in these was carried on to 1850 from Perrey's annual catalogues. Between 6000 and 7000 separate earthquakes are recorded as having occurred in most every part of the world, both on land and sea; though seismic energy may thus become sensible at any point of the earth's surface, there are, as everyone knows, certain regions peculiarly subject to earthquakes, and it is, in fact, from these seismic bands of variable width following the great lines of elevation which divide the oceanic basins.

It is a few years since Professor Alexis Perrey, of Dijon, sought to trace a relation between the occurrence of earthquakes and the age of the moon. By careful analysis of his catalogue he believed that he had established the fact that earthquakes are more frequently at the syzygies than at the quadratures, that their frequency increases at the perigee and diminishes at the apogee of the moon, and that shocks are more frequent when the moon is on the meridian than when 90° from it. Such a connection between seismic phenomena and the phases of the moon would accord with Zan tedeschi's views on the existence of a terrestrial or ferrous zone, views which were based, however, on the old hypothesis of a liquid nucleus in the earth, covered by a thick crust.

The cylinders stand upright on the planks in the order of their size, with a space between each pair greater than their height, so that when one pillar falls it does not strike its neighbour. The surrounding floor is covered to the level of the planks with dry sand. When a shock passes, some of the cylinders are overturned, the number depending on the velocity of the wave. Suppose the shock knocks over the narrow-based cylinders 4, 5, 6, leaving Nos. 1, 2, 3 standing; then the velocity of the horizontal component must have been greater than that needed to overturn No. 4, but great enough to overturn No. 3. Hence the velocity (V) can be approximately obtained by using a formula due to Professor Haughton, viz.:

\[
\theta = \frac{150\pi^2 + 16\pi^2}{125^2} \sqrt{v^2 + \frac{3}{2} \left(1 - \cos \theta \right)}
\]

where \(a\) is the altitude of the column, \(b\) the diameter of its base, and \(\theta\) the angle formed by the inclination of the column drawn through the centre of gravity to the extremity of the base. The direction in azimuth is indicated by the position in which the overturned pillars are found, since the bed of sand prevents rolling. It is possible to obtain the exact time at which the shock commences by connecting the narrow-based pillar with the pendulum of a clock so as to stop it at the instant of overthrow. Where the angle of wave-emergence is very steep, this instrument is not to be recommended, since it ignores the vertical element of the shock.

Annual reports on earthquakes have been published for many years by Professor Fuchs. During the year 1858 he recorded 104 earthquakes, which were distributed among the months as follows.—In January 10, February 10, March 14, April 8, May 7, June 7, July 8, August 5, September 7, October 14, November 5, December 9. In the preceding year 97 earthquakes were noted, occurring as follows.—In January 15, February 7, March 12, April 7, May 9, June 10, July 6, August 5, September 3, October 2, November 9, December 12.

error arising in the first instance probably from their invariable habit of secretting themselves in any cavity, of which they always endeavour to reach the innermost recess (instances being known of the common species hiding itself in the ear of a person sleeping in the open air), and strengthened by the popular exaggerated idea of the strength and attributes of the anal forceps peculiar to these insects.

Earwigs have been for some time of uncertain position in classification, having been ever considered as worthy of the rank of a separate and distinct family, Spaltotrepidae; Duncker, (Lobododera), Longhorn, (Dermatera), Dorsaloptera, Loven; and Euphotopterina, (Dutroct), (the Locustae, Grasshopper, Crickets, Cockroaches, Mantis, &c.) They have much the habits of the Brachytela or Stephysyphus in the Coleoptera (Beetles), from which order they differ in their paps being active, resembling the perfect insect except in possessing only rudimentary wings, &c.; also in the method of folding and seoration of the hinder wings, the presence of an anal forceps, and, as in the Orthoptera, in the external additional lobe to their maxilar. From all the other Orthoptera, apart from the anal forceps, they differ in having horizontal elytra covering the wings in repose in beetles, and in the female not possessing a cocoon scavenger, and from most of them in the hind legs being not formed for jumping.

Of distinct species 250 are recognized, comprised in 34 genera (of which some are apparently needless), but it is highly probable that the present range of the genus, as scarred by naturalists make them an object of study, and their geographical distribution is very extended. There are about 200 species in the collection of the British Museum alone, mostly unnamed, and not specially collected. They are found in the whole of Europe, in Syria, and Asia Minor, Ceylon, China, and Japan, the Malay Archipelago, the Philippine; North, West, and South Africa to the Cape itself, Egypt, Zanzibar, Mauritius, Ceylon, New Guinea, South Australia, Tasmania, and New Zealand, and species occur in such isolated localities as Madeira, the Canaries, St. Helena, Woodstock Island, the Sandwich, and the Sandwich Islands, and Kerguelen's Island. As regards pre-historic times, a few fossil species have been found in the territories of Solnhofen, Eicheng, in Italy and in the Old World, and of the Rocky Mountains (Colorado) in the New Seven species have been recorded from Great Britain, of which two are universally common, viz., Forficula auricularia, and the smaller Lobula minor. The former is found all over Europe, in Armenia, Ceylon, and other parts of Asia, and in the eastern United States, being also recorded from Japan, and the latter occurs in Europe, Western Asia, and North America. Another species, Lobododera tympany, extends over the entire Old World.

All are of comparatively small size, and nearly all of ob­scure colours, mostly various shades of brown or dull yellow, and of a much smaller size, one South American species is with another, from the Amazon, has blue metallic elytra, which are metallic also in another from Peru, a fourth exotic species is yellow, with black stripe, and several have opaline or irisdecent wings. Ectenaty development is shown chiefly in the forceps, which in a Nicaraguan species are as long as the rest of the body; in another South American form the abdomen is laterally toothed, a third has very long legs, being almost tipuline, Apachya has the body as thin as cardboard. Sexual differences are shown in the male by the greater development and armature of the forceps, or the tuberculated abdomen, which is composed of nine distinct segments, whereas only seven are evident in the female. The forceps have been observed to be used in arranging the wings, and are also supposed to be used as weapons of offence and defence, through it is difficult to understand how they could be of any practical assistance for either purpose. The lower wings have long attenuated appendage, and an unpaired organ of flight, Poceleria curricularia has seldom, if ever, been observed to make use of the wings, though there is evidence that it does fly, but the other common British species, Lobula minor, is frequently seen on the wing, being often mis­taken for a brachyleptous beetle. It may be observed that the possession of wings is apparently sexual in some cases, and that some species are entirely apetrous.

Some few instances have been recorded of earwigs being carnivorous, devouring the larvae and pupae of wild bees and even their own species; but the majority are in a normal state certainly eaters of vegetable matter, congregating under bark, and destroying flowers, fruit, &c., often to a considerable extent. An instance of their adaptability to circumstances is afforded by Mr. H. W. Bates's discovery of a large white species (above referred to) very common on white sandy beaches of the Brazilian river Para, at Carpó with a white Tetracha and a white mole cricket, this white­ness was permanent, and must not be confused with the light colour of recently disclosed individuals.

The female of the common earwig has long been noted for an exhibition of remarkable maternal instinct in defending her progeny, not only brooding over her eggs, but caring for her newly hatched young.

The chief writers on Forficula are Dobson, in the Straten exomologische Oekologie for 1863 and following years, and quite recently, S. H. Scudder, in the Proceedings of the Boston Natural History Society, vol. xiv., the latter being the first to express these insects in a collective form (P. E. B).

EASEMENT, in English law, is a species of servitude or limited right of use over land belonging to another. It is distinguished from a profit, which is a right to take the soil of another, while an easement is a right to use the soil or the produce of the soil in a way tending to the more convenient enjoyment of another piece of land. Thus a right of way is an easement, a right of common is a profit.

Besides rights of way the most important easements are water-courses (as where a person has a right to divert a flow of water), the right to discharge water, &c., upon a neighbour's land, and the right to restrain such a use of land as would obstruct the access of light and air to an ancient window.

EASTBOURNE, a watering-place on the Sussex coast, 66 miles from London by railway. It is situated about three miles inland to the east of Beachy Head, the flattest head land on the English Channel. It once consisted of three parts—the old village of East Bourne, a mile inland, South Bourne, lying back from the shore, and Seabournes, facing the beach, but these distinctions are now almost obliterated, and numerous handsome terraces and detached houses have more or less united the three old hamlets into one town. Besides the parish church of St. Mary's, a building of some antiquity, there are four chapels of ease in Eastbourne. A pier was erected in 1869. The population, which is rapidly increasing, was 10,361 in 1911.

EASTER, the annual festival observed throughout Christendom in commemoration of the Resurrection of our Lord Jesus Christ. The word Easter—Anglo-Saxon, Eastre, Easter, German, Ostern—like the names of the days of the week, is a survival from the old Teutonic mythology. According to Bede (De Temp. Ratu, c. xv.) it is derived from Eostre, or Ostara, the Anglo-Saxon goddess of spring, to whom the fourth month, answering to our April—thence called Easter-monath—was dedicated. This month, Bede informs us, was the same as the "Menus Paschala," when the old festival was observed with the gladness of a new solemnity."
The name by which Easter is known among the Romance nations—French paques; Italian, pasqua; Spanish, pascua—is derived through the Latin pascha, and the Greek paíka, from the Chaldean or Aramaean form, מִסְכָּה (misca), of the Hebrew name of the Passover festival, פֶּסַח, from פַּסַח, “he passed over,” in memory of the great deliverance when the destroying angel “passed over” the houses of the children of Israel in Egypt when he smote the Egyptians.” Exp. xii. 27. An erroneous derivation of pascha is given by some of the early fathers of the church, e.g., Irenæus, Tertullian, T càc., to whom Hebrew was an unknown tongue, from the Greek πάσχειν, “to suffer,” as being the period of our Lord’s sufferings. St. Augustine (in Joann. Tract. 56) notices this false etymology, and shows how similarity of sound had led to the error, and gives the true derivation.

There is no trace of the celebration of Easter as a Christian festival in the New Testament or in the writings of the apostolic fathers. The sanctity of special times or places was an idea quite alien from the early Christian mind, too profoundly absorbed in the events themselves to think of their external accidents. “The whole of time is a festival unto Christians because of the excellency of the good things which have been given, writes Chrysostom, commenting on the passage Col. v. 17, which has been erroscously supposed to refer to an apostolic observance of Easter. Origen also in the same spirit (Contr. Celsum, v. 22) urges that the Christian who dwells on the truths of Christ of our Presentation and the gift of the Holy Ghost, in every day keeping an Easter and Pentecostal feast. The ecclesiastical historian Socrates (Hist. Eccl. v. 29) states with perfect truth that neither Christ nor his apostles enjoined the keeping of any or any other festival. “The apostles,” he writes, “had no thought of appointing festival days, but of promoting a life of blamelessness and purity;” and he attributes the introduction of the festival of Easter into the church to the perpetuation of an old usage, “just as many other customs have been established” This is doubtless the true statement of the case. The first Christians, being derived from, or intimately connected with, the Jewish Church, naturally continued to observe the Jewish festivals, though in a new spirit, as commemorations of events of which these had been the shadows. The Passover, ennobled by the thought of Christ the true Paschal Lamb, the first-fruits from the dead, continued to be celebrated, and became the Christian Easter. Thus the human instinct which everywhere cries for the commemoration of marked epochs in their national, social, ecclesiastical, or national life, found its legitimate gratification in the public celebration of the events which are the foundation of the Christian faith.

But though the observance of the Paschal festival at a very early period became the rule in the Christian church, a difference as to the time of its observance speedily sprang up between Christians of Jewish and Gentile descent, which led to a long-continued and bitter controversy, and an unhappy severance of Christian union. No rule as to the date of the Easter festivals having been laid down by authority, Christians were left to follow their own instincts. These were naturally different in the Jewish and Gentile churches. The point at issue really was the date of the termination of the Paschal fast. With the Jewish Christians, whose leading thought would be the death of Christ as the true Paschal Lamb, this fast would end at the same time as that of the Jews, on the 14th day of the month, at evening, and the Easter festival would immediately follow, entirely irrespective of the day of the week. With the Gentile Christians, on the other hand, unfettered by Jewish traditions, the first day of the week would be identified with the Resurrection festival, and the preceding Friday would be kept as the commemoration of the Crucifixion, irrespective of the day of the month, the last continuance of the moulding elements in Easter usage. With the one, therefore, the observance of the day of the month, with the other the observance of the day of the week, was the ruling principle. The chief point was the “keeping” or “not keeping” the 14th day of the moon corresponding to that of the month Nisan. Those who, adopting the Jewish rule, did so keep the 14th day were called Τετραώδειοι, Τετράυδειοι, Τετρακάτακτοι, and were stigmatized as heretics. In the absence of any authoritative decision as to the day to be observed and the proper mode of calculating it, other discrepancies arose, which led to controversies and dissensions which, in the words of Ephraem (Pasar, H. E. ixx.), distracted the church, and became a source of mockery and ridicule to the unbelievers. “Some,” he writes, “began the festival before the week, some after the week, some at the beginning, some at the middle, some at the end, thus creating a wonderful and laborious confusion.”

This diversity of usage was gradually brought to an end by the verdict of the Church of Rome. The Roman Christians adopted the ordinary Gentile usage, which, within certain limits, placed the observance of the Crucifixion on a Friday, and that of the Resurrection on the following Sunday. A decree of Pope Pius I., c. 147—the genuineness of which, however, is by no means established—proclaims that “the Pasch should be celebrated on the Lord’s Day by all.” His successor Anacletus was equally firm upon the point. Polycarp, the venerable and sanctified bishop of Smyrna, who, according to Irenæus (apud Euseb., H. E. v. 24), visited Rome in 159 with this object, failed to induce Anacletus to conform to the Quartodecimans usage, which Polycarp had inherited from his master, the Apostle John. Anacletus declined to permit the Jewish custom in the churches under his jurisdiction, but made no scruple of communicating with those who adopted it, and allowed Polycarp to celebrate the Eucharist at Rome. Between thirty and forty years after this visit (197) the same question was controverted in a very different spirit between Victor, bishop of Rome, and Polycrates, bishop of Ephesus, the aged metropolitan of proconsular Asia. This province was the only portion of Christendom that still maintained the Quartodeciman usage, which had been dropped even by the churches of Palestine and Alexandria. Victor's despotism demanded that the Asiatic churches should adopt the Roman system having been met by Polycrates with a courteous but firm refusal, Victor proceeded to excommunicate him and all who held with him. So sweeping a measure shocked the Christian world. Irenæus renounced with the bishop of Rome, and ultimately the Asiatic churches were allowed to retain their usage unmolested. (Euseb., H. E. v. 23-25.) We still find the Quartodecimans usage springing up from time to time in various places, but it never took permanent root, and at the time of the Council of Nicea (325) the Syrians and the Antiochenes were the solitary champions of the Jewish rule. The settlement of this controversy was one among the causes which led the emperor Constantine to summon that council. The consent of the assembled prelates was unanimous. All agreed that Easter should be kept on one and the same day throughout the world, and that none should hereafter follow the blindness of the Jews (Socr., H. E. i. 9). Nothing, however, was said as to the determination of the day. This was practically left to be calculated at Alexandria, the home of astronomical science, by the bishop of that See of the day of the week of the Easter festivals, in the hands of the church under his jurisdiction and to the bishop of Rome, by whom it was to be communicated to the Western churches.
But although measures had thus been apparently taken to secure uniformity of observance, some centuries elapsed before any discrepancy ceased. A more intricate question remained to be solved, viz., how the full moon on which Easter depended was to be predicted. The Nicene decrees had effectively crushed the febrile remnants of the Quartodeciman usage. It was established as a rule that Easter must be kept on a Sunday, but there was no general agreement as to the cycle by which the festival was to be calculated. Some churches adopting one rule, some another. We learn from St. Ambrose (Epist. 23) that in 357 the churches of Gaul kept Easter on March 21, while the churches of Italy postponed it to April 18, and those of Egypt a week later still, to April 25. It appears from an epitaph of Leo the Great (Epist. 64 ad Marcan.) that in 458 there was eight days' difference between the Roman and Alexandrine Easter. Similar discrepancies are mentioned by Gregory of Tours in the year 577, nor did they disappear from the Gallican Church till the 8th century, although by a canon of the Council of Orleans (541) it had been ordained that the Easter festival should be kept at the same time by all, according to the tables of Victorinus. The ancient British Church observed the 84 years' cycle which they had originally received from Rome, and their stubborn refusal to give it up caused much bitter controversy between the Fathers of Iona and the Latin missionaries. These latter universal attempted to fix the stigma of the Quartodeciman heresy on their opponents, and they are sometimes even now spoken of as adopting the Asiatic mode of calculation, and false inferences are thence drawn to the Eastern origin of the British Church. This view is quite erroneous. The early British and Irish Church always commemorated the Crucifixion on a Friday and the Resurrection on a Sunday. The only difference between them and the Roman Church was in the cycle adopted for the computation of the festival, the British Church really adhering to the cycle originally adopted by the Roman Church itself, which had been superseded by the more accurate calculations of Victorinus of Aquitaine (457), and of Dionysius Exiguus (525). This led to a double Easter being observed by the adherents of the two churches. Thus, as we learn from Peires (Ecat. Hist., 257), in 651 Queen Eumanda, adopting the Roman rule, was fasting and keeping Palm Sunday while her husband Oswy, king of Northumbria, was celebrating the Easter festival. This diversity of usage was put an end to in the kingdom of Northumbria by the council of Bernham, or Whitby (664), and the Roman rule was finally established in England by Archbishop Theodore in 669. This rule may be thus briefly stated. Easter day is the first Sunday after the 14th day (not the full moon) of the calendar month which happens on or next after March 21. This calendar month, however, is not the moon of the heavens, nor the mean moon of the astronomers, but an imaginary moon created for ecclesiastical convenience in advance of the real moon (see Prof. De Morgan’s article in Companion to the Almanac, 1848). After nine centuries a fresh discrepancy in the observance of Easter between the Roman and the English Church was caused by the refusal in England to adopt the Gregorian reformation of the calendar, 1582, apparently for no other reason than that the alteration had originated at Rome. Thus difference was happily put an end to in 1752, when the “New Style” was adopted in the United Kingdom. The churches of Russia and Greece, and the Oriental churches generally, still observe the unformed calendar, their Easter falling sometimes before sometimes after that of the Western Church; very rarely, as in 1855, the two coincide. The rules on which the calculation of Easter is based are given in the article Calendar (vol. iv. p. 675).

Easter day, as commemorating the central fact of our religion, has always been regarded as the chief festival of the Christian year, and has been from the earliest times observed with a stately and elaborate ceremonial. It is not, however, the purpose of this article to enter on the ritual observances of Easter, nor on the many curious and interesting popular customs of which the sending of Paschal Eggs, or Easter eggs, is one of the most widely spread with which it is connected in all Christian nations. For these last the reader may consult Brand’s Popular Antiquities, Home’s Every Day Book, and Chambers’s Book of Days.

EASTLAKE, Sir Charles Lock (1793–1865), English painter who became president of the Royal Academy in London, was born on 17th November 1793 in Plymouth, where his father, a man of uncommon gifts but of indolent temperament, was solicitor to the Admiralty and judge ad vocate of the Admiralty Court. Charles was educated (like Sir Joshua Reynolds) at the Plymouth grammar-school, and in London at the Charterhouse. Towards 1809, partly through the influence of his fellow-Devonian Haydon, of whom he became a pupil, he determined to be a painter. He also studied in the Royal Academy school. In 1815 he exhibited in the British Institution his first picture, a work of considerable size, Christ restoring sight to the Daughter of Jairus. In 1814 he was commissioned to copy some of the paintings collected by Napoleon in the Louvre, and he returned to England in 1816, and practised portrait-painting at Plymouth. Here he saw Napoleon a captive on the “Bellerophon,” from a boat he made some sketches of the emperor, and he afterwards painted, from these sketches and from memory, a life-size portrait of him, which was pronounced a good likeness. It belongs to the marquis of Lansdowne. In 1817 Eastlake went to Italy, in 1819 to Greece, in 1820 to Italy, where he remained altogether fourteen years, sojournimg chiefly in Rome and in Ferrara. Subjects of banditti and peasant-life engaged his pencil mostly from 1820 onwards. In 1827 he exhibited at the Royal Academy his picture of the Spartan Isidore—who (as narrated by Plutarch in the life of Agesilaus), rushing naked out of his bath, performed prodigies of valour against the Tholos host. This was the first work that attracted much notice to the name of Eastlake, who in consequence obtained his election as A.R.A., in 1830, when he returned to England, as R.A. In 1850 he succeeded Shakspeare as R.A. (his only worthy competitor being Landseer), with the education of the Prince of Wales besides, to mark the poor estate of British art, or of its official representatives), and, as usual, he was knighted. Prior to this, in 1841, he had been appointed secretary to the Royal Commission for decorating the Houses of Parliament, and he retained this post until the commission was dissolved in 1862. In 1843 he was made keeper of the National Gallery, a post which he resigned in 1847 in consequence of an unfortunate purchase that caused much animadversion, in 1855, director of the same institution, with more extended powers was created. During his directorship he purchased for the gallery 155 pictures, mostly of the Italian schools. He became also a D.C.L. of Oxford, F.R.S., Chevalier of the Legion of Honour, and member of various foreign academies. In 1849 he married Miss Elizabeth Rigby, a lady of some literary distinction. In 1865 he fell ill at Milan; he died at Fiesa on 24th December in the same year, and was buried at Kensal Green. As a painter, Eastlake was gentle, harmonious, delicate, and correct, lacking fire of invention or of execution; eclectic, without being exactly imitative, influenced rather by a love of ideal grace and beauty than by any marked bent of individual power or vigorous originality. Among
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his principal works (which were not numerous, 51 being
totally exhibited in the Academy) are,—1826, Pilgrima
arriving in sight of Rome (repeated in 1855 and 1866, and
perhaps in the whole chassis-paintings); 1829, Byron's Dream
of the national Gallery, 1834, the Escape of Francesco
di Carrara (a duplicate in the National Gallery), 1841,
Christ lamented over Jerusalem (ditto); 1843, Hagar and
Ismael; 1845, Comus, 1849, Helena, 1851, Ippolito
Torelli; 1853, Violante, 1855, Esdrasil. These female
Venetian glow of tint, are the most satisfactory specimens of
Eastlake's work to an artist's eye. He was an accomplished
and judicious scholar in matters of art, and published, in
1840, a translation of Goethe's Theory of Colours, in 1847
(his chief literary work) Materials for a History of Oil
Painting, especially valuable as regards the Flemish school;
in 1848, Contributions to the Literature of the Fine Arts;
in 1851 and 1855, translated editions of Kugler's History of
the Italian School of Painting, and Handbook of
Painting.

Sir Charles Eastlake was a man of middle height, spare
form, reddish complexion, bright hair (scanty in advanced
life), of unassuming and rather courtier-like bearing;
reluctant to oppose or offend, but with a strong sense of
official duty. He was a neat and appropriate speaker, and
accepted his presidential and other offices with great credit
in the eyes of all who appreciate moderation and cultured
finish in the speech and bearing of a public man.

EASTON, a borough of the United States, and capital
of Northampton county, Pennsylvania, is situated on the
right bank of the Delaware immediately above the
course of the Lehigh, 54 miles north of Philadelphia.
The town is very systematically arranged in spite of the
irregularity of the ground on which it is built; the water
supply from the Lehigh river is abundant, and a strong
pressure is obtained by the elevated position of the
reservoirs. As the centre of a rich agricultural and mineral
district, with free communication both by land and water,
Easton has considerable activity at once in trade and
manufacture. Among its establishments the borough
contains breweries, tanneries, carriage factories, iron
foundries, a rope-walk, and an oil-factory; and South
Easton, on the other side of the Lehigh, has a cotton-
factory, a rolling-mill, and railway engineering works.
The principal buildings are the farmers' and mechanics' institute,
the free reading room, and the Presbyterian or Lafayette
College, which was founded in 1831, and in 1872 had 25
teachers and 359 students. The borough, laid out in
1765, was incorporated in 1789. Population in 1870,
10,887; or, if South Easton be included, 14,154.

EAST SAGINAW, a city of Saginaw county, Michigan,
United States, is situated on the Saginaw river, about 90
miles N.N.W. of Detroit. It extends about three miles
along the river, with a breadth of nearly a mile. It is
the principal depot of the salt and lumber trade of the Saginaw
valley, and possesses foundries, boiler-shops, saw-mills, and
shingle-mills. It is the terminus of the Saginaw Valley
and St. Louis Railway, while a branch of the Flint and Pere
Marquette Railway radiates here to Bay city and another
to Caro, Tuscola county. On the opposite bank of the
river is the Jackson, Lansing, and Saginaw line. East
Saginaw was incorporated as a village in 1853, and obtained

EAU DE COLOGNE, a perfume, so named from the
city of Cologne, where its manufacture was first established
by an Italian, Giovanni Maria Faina, born in 1685, and
by other members of his family, some of whom made it
according to a method due to one Paul Fumus in 1674;
there were in Cologne 33 establishments for the preparation of
the perfume, 28 of which were in the hands of persons
bearing the name of Farina. Eau de Cologne consists of
a solution of various essential oils in strong alcohol. The
purity and thoroughness of the manufacture is of the greatest
importance in the process of manufacture. It was
originally prepared by making a spirituous infusion of
certain flowers, pot-herbs, drugs, and spices, and adding
thereto, after distillation, definite quantities of several
vegetable essences. See Laboulaye, Dictionnaire des Arts et
Manufactures, vol. ii., p. 515. Eau de Cologne consists
of

EBEL, HERMANN WILHELM (1820-1875), a distin-
guished philologist, was born at Berlin, May 10, 1820. He
displayed in his early years a remarkable capacity for the
study of languages, and at the same time a passionate fond-
ness for music and poetry. At the age of sixteen he became
a student at the university of Berlin, applying himself
especially to philology, and attending the lectures of Boeckh.
Music continued to be the favourite occupation of his leisure
hours, and he pursued the study of it under the direction
of Marx. In the spring of 1838 he passed to the university
of Halle, and there began to apply himself to comparative
philology under Pott. Returning in the following year to
his native city, he continued this study as a disciple of
Bopp. He took his degree in 1842, and, after spending
his year of probation at the French Gymnasium of Berlin,
he resumed with great earnestness his language studies.
About 1847 he began to study Old Persian. In 1852 he
accepted a professorship at the Beheim-Schwarzbach
Institution at Flieben, which post he held for six years. It
was during this period that his studies in the Old Slavic and
Celtic languages began. In 1858 he removed to Schnedem-
hul, and there he discharged the duties of first professor
for ten years. He was afterwards called to the chair of
comparative philology at the university of Berlin. The
most important work of Dr Ebel in the field of Celtic
philology is his revised edition of the Grammatica Celtica
of Professor Zeuss, completed in 1871. This had been pre-
ceded by his treatises—De serva Britannicui futuro ac com-
junctione (1866), and De Zevus curii positus in Grammatica
Celtica (1869). He made many learned contributions to
Kuhn's Zeitschrift fur vergleichende Sprachforschung, and
to Schleicher's Beitrage zur vergleichenden Sprachforschung;
and a selection of these contributions was translated into
English by Sullivan, and published under the title of Celtic
Studies (1853). Ebel contributed the Old Irish section to
Schleicher's Indogermanische Chrestomathie (1869). Among
his other works must be named Die Lehworter der Deutschen
Sprache (1856). He died at Misdroy, August 19, 1875.

EBERHARD, SURNAMED BAET (Barbutus), count and
afterwards first duke of Wurttemberg, was born December
2, 1445. He was the second son of Count Ludwig I.,
who died in 1450; and he succeeded his elder brother,
Ludwig II., at the age of twelve (1457). The guardan-
ship of the young count was assumed by his uncle, Count
Ulrich, and he had for tutor the learned John Nauclerus.
Coveting power and careless of learning, he profited little
by the learning of his tutor; and at the age of fourteen he
succeeded in throwing off the restraint of the guardianship,
and assumed the government. But instead of discharging
its duties he thought only of indulging his passions, and
for a time led a wild, reckless life. By some means he
was brought to serious reflections, and we find him, accord-
ing to a custom which had not become wholly extinct,
undertaking in 1458 the pilgrimage to Jerusalem. He also
visited Italy, and made acquaintance with some of the most
famous scholars of the age. His marriage with Barbara,
daughter of Lodovico di Gonzaga, contributed to the amend-
ment and elevation of his character. He began to study
law and to take a practical interest in the promotion of the new
learning, and at the instigation of his wife he founded, in
1477, the university of Tubingen. There he came, in 1481.
the young advocate John Reuchlin, who lectured on Greek at the university and took his degree of doctor of laws. Count Eberhard conceived a great liking for him, appointed him his private secretary, and named him councillor. In the spring of 1482 Eberhard, accompanied by Reuchlin, visited Rome, had an audience of Pope Sixtus IV, and received from him the Golden Rose. On his return he visited Florence, and enjoyed the society of the group of scholars gathered around Lorenzo de' Medici. It was in the same year that Eberhard, by the treaty of Manningen, put an end to the evils which had arisen from a division of the county made in 1437 between his father and his uncle Ulrich, as representatives of the two lines of Urach and Stuttgart, and secured the future indivisibility of Wurttemberg, and the right of primogeniture in his own family. The treaty was made under the guarantee of the empire, and was sanctioned by an assembly of prelates, knights, and landed proprietors. By a limitation of the power of the prince agreed to at the same time, Count Eberhard became the founder of the constitution of Wurttemberg. He made Stuttgart his place of residence, and retained Reuchlin in his service till his own death. Eberhard sympathized with the desire that was daily strengthening for a thorough reformation in the church, and in his own dominions he rendered great services by his regulation of convents. Some of these institutions he secularized. Though a lover of peace, he knew how to bear the sword when war was necessary; and by his courage, wisdom, and fidelity to his engagements he secured the esteem and friendship of the emperors Frederick III and Maximilian I, as well as that of other princes of his time. He was one of the leading members of the Grand Swabian League formed in 1498, and took part in the liberation of Maximilian, then king of the Romans, from his imprisonment at Burgos. In recognition of his great services the emperor at his first diet, held at Worms in 1495, raised Eberhard, without any solicitation on his part, to the dignity of duke, confirming at the same time all the possessions and prerogatives of his house. Duke Eberhard did not live long to enjoy his new dignity. He died at Tubingen on the 25th of February 1496. He had two children by his marriage, but these died in their infancy, and with him the line of Ursch became extinct.

EBERHARD, August Gottlob (1769-1845), a German poet and miscellaneous writer, was born at Belzig, near Wittenberg, in 1769, and died at Dresden on the 15th May 1845. He studied theology at Leipsic; but some stories he contributed to periodicals having proved successful, he devoted himself to literature. Among his earlier works were Ida's Blumenkorbchen (1792), Lust und List, oder was ein Knabe nicht vermag; Ferdinand Werner, der arme Flottenpieler (1802); Pruss Pet Ehr (1804); and Ich hatte Kraft's Lehren und Thaten (1807). For a time he was associated with Becker in the editorship of his Taschenbuch and his Erhellungen, for both of which he wrote numerous tales and sketches. His claim to permanent literary fame, however, depends almost exclusively on his Haunchen und die Kuchles (1823), a charmingly graceful narrative poem in ten parts, which has passed through many editions, and been translated into most of the languages of Europe. An English translation by James Crouchane was published in 1854. In his Der Erste Mensch und die Erde (1828), a poem written in hexameters, the narrative of the creation is given with dignity and spirit. After the death of Vater in 1826, Eberhard succeeded to the editorship of the Jahrbuch der hauslichen Anstalt, a well-known German educational annual. The miscellaneous poems (Vermachte Gedichte) of Eberhard appeared in two volumes in 1833, and his collected works (Gesammelte Schriften) in 20 volumes in 1830-1.
Prussia conferred upon him the honorary title of a privy-counsellor. In 1798 he obtained the degree of doctor in divinity, which was afterwards given him as a reward for his theological writings. He died January 6, 1809.

Eberhard's attainments in philosophy and literature were extensive and profound. He was master of the learned languages, spoke and wrote French with facility and correctness, and understood English, Italian, and Dutch. He had read a great deal, was thoroughly versed in the philosophical sciences, and possessed a just and discriminating taste for the fine arts. He was a great lover of music, and was himself a proficient in the art.

The following is a list of his works—Neue Apologie der Sorenian, &c., 2 vols 8vo, 1772-3, Allgemeine Theorien des Dekans und Magneden, &c., Berlin, 1778, 8vo, an essay which gained the prize assigned by the Royal Society of Berlin for that year, Von dem Begriff der Philosophie und ihren Titeln, Berlin, 1778, 8vo,—a short essay, in which he announced the plan of his lectures on being appointed to the professorship at Halle, Lobreich auf Herrn Johannes Thunmann Prof der Wissenschaft und Berufskraft der Universitat zu Halle, Halle 1779, 8vo, Amatory, eine Geschichte in Dreimal, Berlin, 1782, 8vo,—written with the view of counteracting the influence of those sceptical and Epicurean sentiments in religion and morals which then prevailed in France, and rapidly spreading amongst the higher ranks in Germany. Uber die Macht der Aufklärung in der Philosophie, &c., Halle, 1783, 8vo, Thesen der Wissenschaft und Wissenschaften, &c., Halle, 1783, 8vo, Vermuthete Schriften, Halle, 1784; Neue Versuche in der Philosophie, &c., Halle, 1787, 8vo, 2d ed. with a continuation and chronological tables, 1796; Versuche einer Allgemeinen Deutschen Synonymik, &c., Halle, and Leipzig, 1791-2, 3 vols 8vo, long reckoned the best work on the synonyms of the German language (an abridgment of it was published by the author in one large volume 8vo, Halle, 1790); Handbuch der Ästhetik, &c., Halle, 1790-3, 4 vols 8vo besides the works above mentioned, Eberhard contributed a number of small tracts and essays to various periodical and scientific publications, and translated several foreign works. He was also the editor of the Philosophical Magazine, Halle, 1788-1795, and of the Philosophical Archives, Halle, 1793-1795. These two periodical works, which are now little read, were instituted for the purpose of counteracting the metaphysical principles of Kant, and of vindicating the doctrines of Leibnitz and Wolff. Frederick Nicolas published a memoir on the life and character of Eberhard, Berlin and Stuttgart, 1810, 8vo. See also K. H. Jorden, Lexicon Deutscher Dichter und Prosaisten.

EBERT, FRIEDRICH ADOLF (1791–1834), a very eminent bibliographer, was born at Taucha, near Leipzig, July 9, 1791. He received his early education partly from his father, preacher to the Georgenhaus at Leipzig, and partly at the Nicholas School. At the age of fifteen he was appointed to a subordinate post in the town library of Leipzig, in which his literary tastes, early awakened, were fostered and strengthened. He studied theology for a short time, first at Leipzig and afterwards at Wittenberg, but, by the advice of a friend, renounced it in favour of history. After the close of his academic studies, he made his appearance as an author by the publication in 1811 of a work on public libraries, and in 1813 of another work entitled "Versuche in der Anordnung der lizae literar commode." In the following year he took part in the reorganization of the Leipzig University Library, and in 1814 was appointed secretary to the Royal Public Library of Dresden. The same year he published P. Taubmann's Leben und Verhältnisse, and in 1819 Torquato Tasso, a translation from Guicciardini with annotations. Anxious to turn to good account the rich resources open to him in the Dresden library, he undertook the work on which his reputation chiefly rests, the Allgemeines bibliographische Lexikon, the first volume of which appeared in 1821, and the second in 1820. This was the first work of the kind produced in Germany; but nevertheless it had a higher aim and a more scientific character than its German predecessors. It was called to the post of chief librarian and professor at Leipzig, and at the same time was offered to the duke of Brunswick at Wolfenbuttel. He accepted the latter. But early in 1825 he returned to Dresden as public librarian; he was soon after named private librarian to the king, and in 1834 chief librarian and sub-councillor. Among his other works are—Die Bildung des Bibliothekars (1820), Geschichte und Beschreibung der Koniglichen öffentlichen Bibliothek in Dresden (1822), Zur Handschriftenkunde (1825–27), and Culturperioden des Deutschen Mittelalters (1829). Ebert was a contributor to various journals and encyclopedias, and took part in the editing of Ersch and Gruber's great work. He died at Dresden, November 13, 1834, in consequence of a fall from the ladder in his library a few days before.

EDENGEN, a town of Wurttemberg, in the circle of the Schwarzwald, on the Schluchse, a left-hand tributary of the Danube, 23 miles south of Tubingen and 37 miles west of Ulm. It has rather more than 5000 inhabitants, who are engaged in woolen-weaving, stock-feeding, hat-making, bleaching, and cattle-dealing.

EBIONITES, a Christian sect which was separated from the general Christian church about the end of the 2d century. The origin of the name has been much disputed, some deriving it from Ebion as the founder of the sect, and others from the Hebrew word (EBPW) meaning poor. For the former opinion the authority of Tertullian is quoted, who makes reference to the existence of such a person as Ebion, but as counter-balancing these references there must be considered—1st, that Tertullian being careless and inaccurate, and having no knowledge of Hebrew, may have merely fallen into the error of assuming that the sect took its name from that of a person, 2d, that no mention is made of the existence of such a person either by Ireneus or Origen, and that any reference to a name and later writers are probably borrowed from Tertullian, and 3d, that the name Ebionites had a very general signification, and represented a natural Judaizing tendency which must have had a more comprehensive beginning than that originating in an individual influence. Those who derive the name from the Hebrew word explain it in two ways—as applicable either to the poverty of the doctrines of the Ebionites, or to the poverty of their circumstances. Undoubtedly the name was applied to them with the former significance by their enemies, but it is more probable that they employed it in a holy name already existing, than that they coined it to suit their purpose. That the term was originally applied to the circumstances of the Ebionites seems the only probable supposition; and the argument in support of it may be stated thus:—That the early Christians, both Jewish and heathen, were designated the poor; that the poverty of the Jewish Christians continued to that of the heathen Christians, and Origen states that they in particular were named the poor (EBPW PHUXOTHZNFWY UN TO OXOULOCW TOI XOPAOY TOV XHETOY ANDAOYO), and that, as the Judaizing Christians came gradually to be the only Jewish Christians who required to be distinguished from the heathen Christians, they retained the name. The fathers show a very imperfect knowledge of the origin, history, and doctrines of the Ebionites, but there cannot be any doubt that at first all Judaizing Christians went under that name. In the New Testament there is evidence of the existence of such a party, though it had not then developed into a recognized sect. This apparently did not happen till after the second destruction of Jerusalem and the founding of the heathen colony of Acha Capitolina, when the emperor Hadrian banished from the neighbourhood all Jews who still retained their national peculiarities. As to the particular opinions of the Ebionites we have no authentic statements of the fathers; but at the end of the 2d century, it is evident that the party was still in existence, and thus for the threefold reason—that by the isolation of the Ebionites from the general church the information obtainable regarding them could only be imperfect; that under
the general name Ebionites a good many varieties of opinion are included, and that their opinions varied at different periods of their history. The term Ebionites is used by some writers to include the Nazarenes, who, while recognizing the binding obligation of the Mosaic law on all Jews, did not regard it as binding on heathen Christians (see Nazarenes), but at an early period the stricter Ebionites must have separated themselves from the Nazarenes, who soon became merged in the general church. Of Ebionites proper Origen distinguishes two classes—those who affirm and those who deny the miraculous birth of Jesus and in this he is following the Eusebians. The extreme Ebionites, according to Origen, were only distinguishable from common Jews by the acceptance of the moral teaching of Christ; while those Ebionites who admitted the miraculous birth of Christ did not recognize His divinity proper, but believed that with His human nature the spirit of an angel or archangel, or even of Adam, was incorporated. Both classes of Ebionites seem to have had these points in common—1st, They emphasized the unity of God; 2d, they affirmed the universal obligation of the Mosaic economy; 3d, of the books of the New Testament they received as genuine only the gospel of St. Matthew, 4th, they denounced St. Paul as a separatist, and 5th, they believed that Jerusalem was yet the city of God, and some of them at least believed in Christ's millennial reign. In the time of Eusebius the Ebionites inhabited chiefly the coasts of the Dead Sea, but they dwelt also in Rome and Cyprus. They vanished from history in the end of the 4th or beginning of the 5th century. The ancient authorities on the Ebionites are Irenæus, Hippolytus, Eusebius, Tertullian, Origen, and Theodoret. In modern literature there are—Geiger, in Stand und Lehre der ersten Christenkirche, vol. ii, Leipzig, 1829; Cremer in Winter's Zeitschrift für wissenschaftl. Theologie, 1829; and by Salza, 1839, Bart, De Ebionitarum origine et doctrina ab Ebenezer superbus (Thumner's Untersuchungen v. 1821), Hugentöld, Die Ebioniten konunungen, Jena, 1845, the article "Ebioniten" in Herrgott's Real-Encyclopädie, and Maintz's Geschichte des ersten und zweiten Centurium, London, 1875.

EBOLI, or Evoli, a town of Italy, in the province of Piacentia Citeriore and district of Campagna, situated about thirteen miles from Salerno, on an elevated site commanding a fine prospect over land and sea. It has an ancient castle belonging to the princes of Angris, and its church of St. Francis of Assisi contains a curious picture of the Crucifixion by Roberto di Olcenio. Between the town and Salerno or Sela are the ruins of the ancient Eboli, a place of municipal rank, and the river is still spanned by a bridge of fine Roman construction Population, 8947.

EBONY (Ebros), the wood of various species of trees of the genus Diospyros and natural order Ebenaceae, found in the tropical parts of Asia and America. The best kinds are very heavy, are of a deep black, and consist of heartwood only. On account of its colour, durability, hardness, and susceptibility of polish, ebony is much used for cabinet work and inlaying, and for the manufacture of pianoforte keys, knife-handles, and turned articles. Ceylon ebony is furnished by D. Eburneum, which grows in great abundance throughout the flat country west of Trincomalee. The tree is distinguished from others by the inferior width of its trunk, and its jet-black, charred-looking bark, beneath which the wood is perfectly white until the heart is reached (See Baker, Eight Years' Wanderings in Ceylon, p. 293, 1855). The wood is stated by Sir J. E. Tennent to excel that obtained from D. reticulata of the Mauritius and all other varieties of ebony in the ligneous and intensity of its dark colour. Although the centre of the trees alone is employed, reduced logs 1 to 3 feet in diameter can readily be procured. Much of the East Indian ebony is yielded by the species D. Melanorrh, a large tree 8 to 10 feet in circumference, with irregular rigid branches, oblong or oblong-lanceolate leaves, white flowers, having a 5-cleft calyx; and a round, pulpy berry, containing 2-8 seeds. The bark of the tree is astringent, and mixed with pepper is used in dyeing Saragosse, near Riga, in the wood of D. Eburneum, the species called by the Singhalese Calodosobha, is black, with rich brown stripes, it is not so durable and heavy as the true ebones. That of D. tomentosa, a native of North Bengal, is black, hard, and of great weight. D. montana, another Indian species, produces a dark wood, variegated with white-coloured veins. D. quaranta is the tree from which is obtained the wood known in Ceylon by the name Calamander, derived by Freiham from the Singhalese katam-marude, black-blowing. Its closeness of grain, great hardness, and fine dark-brown colour, mottled and striped with black, render it a valuable material for veneering and furniture-making. Chinese ebones is believed to be the wood of a species of Melo, a genus of Ebenaceae. What is termed Jamaica or West Indian ebony and probably also the green ebony of commerce are produced by Brey Eburna, a ligneous tree or shrub, having a trunk rarely more than 4 inches in diameter, flexible many branches, and orange-yellow, sweet-scented flowers. The wood is greenish-brown in colour, heavier than water, exceedingly hard, and capable of receiving a high polish. From the book of Ezekiel (xxvii. 15) we learn that ebony was among the articles of merchandise brought to Tyre, and Herodotus states (iv. 97) that the Ethiopians every three years sent a tribute of 200 logs of it to Persia. Ebony was known to Virgil as a product of India (Geor., i. 116), and was displayed by Pompey the Great in his Mithridatic triumph at Rome. By the ancients it was esteemed of equal value for durability with the cypress and cedar (see Piny, Nat. Hist, vi. 9, xv. 79). According to Solinus (Polyhistor, cap. iv. p. 363, Paris, 1621), it was employed by the kings of India for sceptres and images, also, on account of its supposed antagonism to poison, for drinking-cups. The hardness and black colour of the wood appear to have given rise to the tradition related by Pausanius, and alluded to by Southey in Thalaba, t. 22, that the ebony tree produced neither leaves nor fruit, and was never seen exposed to the sun. EBRO (in Latin Ibora), the principal river of Spain, rises in the Cantabrian province of Santander, flows in a general south-east direction through Old Castile, Navarre, Aragon, and Catalonia, and falls into the Mediterranean about 80 miles south-west of Barcelona, in 40° 41' N lat. and 0° 30' E long, forming by its delta a very considerable expanse on the otherwise regular outline of the coast. It has a total length of about 340 miles, and its drainage area is calculated at 31,445 square miles. Already a noble stream when it breaks through the pass of Horadada, it becomes navigable about Tudela, but its value as a means of communication is almost neutralized by the obstacles in its channel, and sailing vessels cannot proceed further up than Tortosa. The great Imperial Canal, commenced by the emperor Charles V., proceeds along the right bank of the river from a point about three miles below Tudela, to the monastery of Monte Terero, five miles below Saragossa, and the San Carlos Canal affords direct communication between Amposta at the head of the delta and the harbour of Los Alfajir. The principal tributaries of the Ebro are—from the right hand the Jalon with its affluent the Júcar, the Huerva, the Huerva, the Querol, the Segre, and the Guadalope; from the left the Aragón, the Galligo, and the Segre with its elaborate system of confiding rivers. 
ECARTÉ (French, écarté, separated, discarded), a game at cards, of modern origin, probably first played in the Paris salons, in the first quarter of the 19th century. It is a development of a very old card game called conspectus or French-cuff (Académie des Jeux, various editions; Cotton and Seymour, Compleat Gamester, various editions; and Paul Boitelle d’Ambly, Les Cartes à jouer, Paris, Hachette, 1854).

Écarté is generally played by two persons, but a pool of three may be formed, the player who is out taking the place of the loser, and the winner of two consecutive games winning the pool. At French écarté (but not at English) bystanders who are betting may advise the players, by pointing to the cards they desire them to play, and the loser of the game goes out and one of the remaining takes his place, unless the loser is playing la clochette (i.e., taking all the bets that are offered), when he does not have to resign his seat if he loses.

A pack of cards is used from which the small cards (from the two to the six both inclusive) are removed. The players cut for deal, the highest having the choice. The dealer gives five cards to each player, the deal being made in the following manner, often betraying the nature of the hand.

The dealer then looks at his cards. If satisfied with them he plays, and there is no discarding, if not satisfied he proposes. The dealer may either accept or refuse. If he accepts each player discards face downwards as many cards as he thinks fit, and fresh ones are given from the undealt cards or stock, first to complete the non-dealer’s hand to five, then to complete the dealer’s. Similarly, a second proposal may be made, and so on, until one player is satisfied with his hand. If the dealer refuses the hand is played without discarding.

If the non-dealer announces that he holds the king of trumps, he scores one; and, similarly, if the dealer holds the king of trumps, he scores one.

The non-dealer, being satisfied with his hand, leads a card. The dealer plays a card to it, the two cards thus played forming a trick. The winner of the trick leads to the next, and so on. The highest card of the suit led wins, the cards ranking king (highest), queen, knave, ace, ten, nine, eight, seven. Trumps win all other suits.

The second player to a trick must follow suit if able, and must win the trick if he can, whether by trumping or otherwise.

The scores are for the king (as already explained), and for the majority of tricks. The player who wins three tricks scores one for the point; if he wins all five tricks, he scores two for the sole. If the non-dealer plays without proposing, or the dealer refuses the first proposal, and fails to win three tricks, the adversary scores two, but no more even if he wins the sole. The game is five up.

Hints to Players.—The following hints, which merely touch on the elements of the play, may be of service to beginners:—

Shuffle thoroughly after every deal to prevent the cards packing in suits, otherwise the trump card is not unlikely to be of the same suit as those preceding it, which are in the dealer’s hand. It is an act of courtesy to the adversary to shuffle your own pack well, to save him the trouble of making your cards.

Do not look at your hand when dealer, and look at the dealer’s hand only after you have decided whether he will propose or not. The countenance or manner often betrays the nature of the hand.

Do not announce the king until in the act of playing your first card.

Propose quickly, as hesitation exposes the nature of the hand. Do not be too quick, the hands which should be played without proposing, called jeux de rôles, ought to be thoroughly known.

They are as follows:

1. Hands with three trumps, whatever the other cards.
2. Hands with two trumps which contain—

a. Any three cards of one plain suit.
b. Two cards of one plain suit, one being as high as a queen.
c. Two small cards of one suit, the fifth card being a king of another suit.

4. Hands intermediate between a and e, i.e., with higher cards in one plain suit, and lower in another, e.g., two trumps, knave, ace of one suit, and nine or eight of another; or ace, ten of one suit, and ten of another; or ten, nine of one suit, and knave of another.

5. Three cards of different suits, as high as king, knave, and a small card, or cards of equal value in different suits, as king, ace, ten; or king, and two tens, or two queens; or queen, knave, ace; or three knaves.

6. Hands with one trump, which contain also—

a. King, queen, knave of one suit, and a small card of another.
b. Four cards of one suit headed by king.
c. Three cards of one suit headed by queen, and queen of another suit.

d. Hands with no trump, which contain three queens or cards of equal value in different suits, e.g., four court cards.

7. Hands from which only two cards can be discarded without throwing a king or a trump

Holding cards which make the point certain, propose, as you have the chance of a refusal, and one good card taken in may give you the sole. If you hold a jeu de rôles, and one of the trumps is the king, it is generally right to propose, as your adversary, if he accepts, cannot then take the king. But, except in the case of the king, the value of the trumps does not affect the proposal hands, as the game is not to lead trumps originally (without the king), unless you have three, but to keep them for trumping, and for this purpose high trumps are no better than low ones.

When discarding, throw out all cards except trumps and kings.

If your adversary proposes you should accept, unless you are guarded in three suits (a queen being sufficient guard), in two suits with a trump, or in one suit with two trumps. Hence the rule not to discard two cards, unless holding the king of trumps, applies to the dealer.

The hands with which to refuse are the same as those with which to play without proposing, except as follows:

1. Two trumps and three cards of one plain suit should not be played unless the plain suit is headed by a court card.

2. One trump and a three major is too weak, unless the fifth card is a court card.

3. Hands With three trumps, a guarded card; but

4. One trump and two queens is too weak, unless both queens are guarded.

5. One trump, queen of one suit, and knave guarded of another should not be played unless the queen is also guarded, or the card of the fourth suit is a court card.

6. One trump, a king and a queen, both unguarded, should not be played, unless the fourth suit contains a card as high as an ace.

7. Four court cards without a trump are too weak to play, unless they are of three different suits.

Refuse with three queens, if two are unguarded; otherwise, accept.

Lead from your guarded suit, and lead the highest. An exception to this rule is when two small trumps, a guarded queen, and a small card of another suit, when the single card should be led.

When playing a weak hand after a refusal, with no hope of the point and fear of losing the sole, lead the strongest single card, unless you have a king.

If the strong suit led is not trumped, persevere with it, unless with king of trumps, or queen (king not having been announced), or knave, ace, when lead a trump before continuing your suit. Also, when playing for the sole with a weak trump and high cards, change the suit each time to avoid a ruff. Having made three tricks, then lead the trump.

You should not lead trumps at starting, even if your best suit, unless you hold king, or queen, or knave, or ace, with court cards out of trumps. Holding three trumps, the two best being in sequence, lead a trump.

If cards are refused, it is better to lead from two small cards in sequence, than from a high tenace.

If you have won two trumps, your opponent one, and you hold a trump and a plain card, lead the plain card; but if your adversary has won two trumps and you win the third, lead the trump.

If you make two trumps and have the queen and two small trumps (the king having been announced against you), by leading a small trump you must win the point.

The score has to be considered. If the dealer is at four, and the king is not in your hand, nor turned up, play any cards without proposing which give an even chance of three tricks, e.g., a queen, a guarded knave, and a guarded ten. The same rule applies to the dealer’s refusal, but he ought to be protected in three suits, e.g., three knaves, or a knave and two guarded tens. At the adverse
score of four, and kung not being in hand or turned up, any hand with one trump should be played, unless the plain cards are very small and of different suits. Further, the rule to ask for cards with the point certain does not hold at the adverse score of four, unless kung is in hand or turned up.

If the non-dealer plays without proposing when he is four to the dealer, and the dealer holds the kung, the non-dealer may then play a trump of not marking it. The same rule applies to the non-dealer after a refusal, if the dealer is four to three.

At an adverse score of non-dealer three, dealer four, the dealer should refuse on moderate cards, as the player proposing at this score must have a very bad hand.

At four a forward game should not be played in trumps, as there is no advantage in winning the role.

**Laws of Ecbatá.**—The following laws are abridged from the revised code adopted by the Tartl Club—

**Cutting**—1. A cut must consist of at least two cards. Card exposed in cutting, false cut *Dealing*—2. Order of distribution of cards, whether by three and two, or vice versa, once selected, dealer must not change it during game. If changed, or wrong number of cards dealt, non-dealer, before he looks at his hand, may claim fresh deal. 3. Dealer turning up more than one card, non-dealer, before looking at his hand, may select either for trump, or may claim fresh deal. If he has looked at his hand there must be a fresh deal. 4. Faced card discovered in pack before trump card is turned, fresh deal. 5. Dealer exposing one of his non-dealer's cards, non-dealer, before looking at his hand, has option of fresh deal. 6. Deal out of turn, discovered before trump turned up, void, and dealer must rectify. 7. Modest discovered after trump card turned, and before proposing or playing, non-dealer has option of fresh deal. If deal stands, dealer cannot mark kung card turned, and neither player having superfluous cards discards them. dealer having superfluous cards, non-dealer draws and looks at them, either having too few cards, hand is completed from stock. Either player, before playing with wrong number of cards, adversary has option of fresh deal. 8. Marking kung—9. Kung turned up may be marked any card that is a trump card of new deal turned in kung. In hand it must be announced before playing first card, and if kung is card first led by non-dealer before being played to, or cannot be marked, sl kung in card first played by dealer, it must be announced before he plays again. 10. Player announcing kung when he has not got it, and playing a card without declaring error, adversary may correct score and have hand played over again. If offender was point or role at hand, he scores one less than he wins. Proposing—11. Proposal, acceptance, or refusal made cannot be retracted. Declaring—12. Cards discarded must not be looked at. 13. Either player taking too many cards, and mixing any with his hand, adversary may claim fresh deal. If deal stands, adversary draws superfluous cards, and may look at them if offender has taken any of the cards given. Non-dealer asking for less cards than he discards, dealer counts as tricks all cards that cannot be played to game before dealer, but if he discards from hand, he may complete hand from stock. 14. Dealer giving more or less cards than asked for, non-dealer may claim fresh deal. If deal stands, non-dealer with too many cards discards superfluous ones, and with too few, hand is completed from stock. 15. Faced card in stock after discarding, player may look at it, as it was put into his hand. 16. Cards exposed in giving cards to non-dealer, he has option of taking them or of having next cards, dealer exposing his own cards, no penalty. 17. Dealer turning up top card, after giving cards, cannot refuse second discard. 18. Dealer accepting when too few cards in stock to supply both, non-dealer may take cards, and dealer must play his hand. Playing—19. Card led in turn cannot be taken up again. Card played to a lead can only be taken up prior to another led, to save revoke or to correct error of not winning trick. Card led out of turn may be taken up prior to its being played to 20. Player naming one suit and leading another, adversary has option of requiring suit named to be led. If offender has none, no penalty. 21. Player abandoning hand, adversary is deemed to win remaining tricks, and scores accordingly. Secretary, and not winning trick—22. For either of these offences same penalty as in law 10. Incorrect packs,—23. Deal in which discovery made, void, preceding deals good. By-passers—24. If players declare to play English skirts, bystanders, having more, not allowed to make remarks or give advice, unless bystanders play out game of player resigning, if bystanders make remark which affects score, player prejudiced may call on him to pay his stock, which bystanders make, bystanders may correct score, give advice (by pointing only), or play game of player who resigns.

**Ecbatanata (Greek, Eékbatáneía), or, as it is found in Ezechiel, Aýbóvneía, a name applied by the classical writers to several and possibly to no fewer than seven distinct sites,—the capital of Media Atropatene, the capital of Media Magna, the citadel of Persepolis, a Syran city on Mount Carmel, the Assyrian castle of Amadiyah, the Aramean stronghold of Europa, and the city of Iphathah.** This diversity of application doubtless arises from the fact that the word was a descriptive epithet, but its derivation has not been ascertained, and it is even possible that under the Greek guise we may have two totally distinct originals. According to the usual hypothesis the meaning is treasury or place of assemblage, from the Old Persian magdan. The Median use of the name is the only one of special moment, involving, as it does, a difficult question of identification. It has long been admitted on all hands that the modern Hamadan, a town of Persia at the foot of the Elwond Mountains, occupies the site and preserves the name of the great city of Ecbatanata, which was the summer residence of the Persian kings from the time of Darius Hystaspes to the Greek conquest, and afterwards became the capital of the Parthian empire. But the further identification of this Ecbatanata with the Ecbatanata of Herodotus, still maintained by some authorities, has been disputed by Sir Henry Rawlinson, who locates the latter city at Takht-i-Suleiman, a conical hill about halfway between Hamadan and Tiberias, which agrees in its main topographical features with the Herodotean description, and is still covered with extensive ruins of ancient date. There it was at least possible for the Median monarch Dares to surround his palace with seven concentric walls of different colours, raising one behind the other, but, if the site of Hamadan be adopted, this part of the account, recently shown by the similar arrangement at Borappa to be so probable in itself, must be relegated to the region of myths. One or other of the cities is possibly mentioned in the Old Testament as Achamutha or Amatha, in the Apocalypse the name frequently occurs in the form of Ekkatanata.


**Eccard, Johannes (1553-1611)**, a celebrated composer of church music, was born at Mindenhausen on the Unstrut, Prussia, in 1553. After having received his first musical instruction at home, he went, at the age of eighteen, to Munich, where he became the pupil of Orlando Lasso, one of the greatest masters of the France-Belgian school, and his company Ecard had to leave. He first made his name in 1574 we find him again at Minden, where he resided for four years, and edited, together with Johann von Bork, his first master, a collection of sacred songs, called *Crepundia sive a Helmsbi.* Soon afterwards he obtained an artistic appointment in the house of Jacob Fugger, the great Augsburg banker, and in 1583 he became assistant conductor, and twelve years later first chancel-master, at Konigsberg in Prussia. In 1608 he received a call to Berlin as chief conductor of the elector's church, but this post he held only for three years, owing to his premature death in 1611. Eccard's works consist exclusively of vocal compositions, such as songs, sacred cantatas, and chorales for four or five, and sometimes for seven, eight, or even nine voices. Their polyphonic structure is a marvel of art, yet excites the admiration of musicians. At the same time his works are instinct with a spirit of true religious feeling. They have indeed a religious and historic significance beyond their artistic value. The important position of music in the service of the Reformed churches is well known. It was derived from the foregoing appeal again to, the feelings of the people. Luther himself recognized the elevating influence of the art by
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cultivating it with zeal and success. His setting of the beautiful words "Euu festa est uxor amabilis" is still regarded by the Germans as their representative hymn. Eccard and his school are inseparably connected with the history of the Reformation.

Of Eccard's songs a great many collections are extant; for an enumeration of the old and rare editions the reader is referred to the works of Winterfeldt, who has devoted great care to the study of Eccard, and by Doring (Choral-klan, p. 47).

ECCELINO, or Ezcelino da Romano (1194-1259), fourth of the name, a famous Ghibelline chief, was born April 25, 1194. The family traced its origin to Eccelin, a knight who about 1088 followed the emperor Conrad II. into Italy, and received from him among other fiefs that of Romano, in the neighbourhood of Padua. Eccelino IV. was the elder of the two sons of Eccelino III., surnamed the Monk, who divided his little principality between them in 1223, and died in 1235. In his youth Eccelino displayed the dauntless courage and the power of dissimulation which characterized him through life. In 1226, at the head of a party of Ghibellines, he got possession of Verona, and was appointed podestat. He became one of the most faithful servants of the great emperor Frederick II., who by a charter granted in 1232, confirmed him in his possessions.

Four years later (1236) he invited Frederick to enter Italy to his assistance, and in August met him at Trent. Eccelino was soon after besieged in Verona by the Guelphs, and the siege was raised by the emperor. Vicenza was next stormed, and the government was given to Eccelino. But he was excommunicated by the Congregation of the Propaganda.

In 1237 the latter marched against Padua, became master of the city by capitulation, and crushed the party of Ghilbellines, whose surname is derived from Eckel, or Eccel, a name of German origin. Eccelino was soon after appointed to his own. He had cultivated philosophy, became professor of Arabic and Syriac in the college of the Propagandists. Called to Paris in 1630 to assist Le Jay in the preparation of his polyglott bible, he contributed to that work the Arabic and Latin versions of the book of Ruth and the Arabic version of the third book of Maccabees. A quarrel with Gabriel Sionita, one of his condutors, whose work he had revised, led to a sharp controversy in which De Flavigny took part. He returned to Rome in 1642, but resumed his residence in Paris in 1645. Being invited by the Congregation of the Propaganda to take part in the preparation of an Arabic version of the Scriptures (1652), he went again to Rome in 1652 or 1653 to Rome, where he died in 1664.

Eccelens is the elder of the two sons of Eccelino II., surnamed Romano, who about 1223, and died in 1235. In his youth Eccelino displayed the book of Ruth and the

ECCHELLENSIS, or Ecclehens, Abraham, a learned Maronite, whose surname is derived from Eckel in Syria, where he was born towards the close of the 16th century. He was educated at the Maronite college in Rome, and, after taking his doctor's degree in theology and philosophy, became professor of Arabic and Syriac in the college of the Propagandists. Called to Paris in 1630 to assist Le Jay in the preparation of his polyglott bible, he contributed to that work the Arabic and Latin versions of the book of Ruth and the Arabic version of the third book of Maccabees. A quarrel with Gabriel Sionita, one of his condutors, whose work he had revised, led to a sharp controversy in which De Flavigny took part. He returned to Rome in 1642, but resumed his residence in Paris in 1645. Being invited by the Congregation of the Propaganda to take part in the preparation of an Arabic version of the Scriptures (1652), he went again to Rome in 1652 or 1653 to Rome, where he died in 1664.

Eccelens published several Latin translations of Arabic works, of which the most important was the Chronicon Orientale of Ibu-ar Râhîm (Paris, 1653). He was engaged in an interesting controversy with Selden as to the historical grounds of episcopacy, in the course of which he published his Chronicon Ecclesiæ ad Seldams Originum (Rome, 1661). Conjointly with Borelli he wrote a Latin translation of the 5th, 6th, and 7th books of the Conics of Apollonius of Perga (1661).

ECCLES, a populous village of England, in the county of Lancaster, four miles west of Manchester by railway, and practically an outlying suburb of that city. The parish church of St Mary, an ancient structure, was enlarged and extensively repaired in 1863-4; and several dissenting places of worship have been built in the present century. The cotton-manufacture is extensively carried on in the immediate neighbourhood. Previous to the Reformation all the monks of Whalley Abbey had a grange at what is still called Monks' Hall; and in 1864 many thousands of silver pennies of Henry III. and John of England and William I. of Scotland were discovered near the spot. Ainsworth, the author of the Latine and English dictionary so long familiar to English students, was born at Eccles in 1660; and it was at the vicarage of the Right Hon. William Huskisson expired on 15th September 1830 from injuries received at the opening of the Liverpool and Manchester Railway.

ECCLESLIA, in Grecian antiquity, the general assembly of Athenian citizens, who met from time to time to discuss public affairs. The first of these were held, according to the laws of Solon, four times in each prytany, or period of thirty-five days; while the others were only summoned on some pressing emergency. When any measure of unusual importance was to be publicly debated, the people were summoned from the country by special messengers. An assembly thus convened was called a cataclena. Much discussion has taken place as to the exact days of the month on which the ecclesiae were held; but the result has only been to prove either that there were no days invariably fixed for them, or that no day was employed by which to determine accurately what these days were. In Ulpian it is stated that when there were three assemblies a-month, the first fell on the eleventh, the second on the twentieth, and
the third about the thirtieth of the month. The likelihood is that they were held at regular intervals though the days were not absolutely fixed. Ecclesiæ were originally held in the Agora or Forum. The place of meeting was subsequently removed to the Pnyx, and afterwards to such of the greater temples as might be most convenient. The Pnyx was by the west of the Areopagus, and commanded an extensive view. It was partly within the city walls, and had an area of about 13,000 square yards. On its northern side, cut out of the solid rock, was the bema or hustings from which the speakers addressed the people. From this tribunal a splendid view of the principal buildings of the city might be had. The right of assembling the people lay with the prytanes, or presidents of the senate or Council of Five Hundred, who both advertised beforehand the business to be discussed, and on the day of meeting sent round a crier to remind the citizens that their presence was required. In times of war, however, or other national crises, the generals of the army sometimes assumed this privilege, though it was necessary for them in doing so to give notice of their intention by a public proclamation. They also sometimes claimed the right of preventing the ecclesia from assembling; but their claims to this privilege were not generally recognized. Such of the citizens as refused to attend were fined, and six magistrates called lexarchs were appointed to collect the fines. To assure a full meeting, the custom was ultimately introduced of paying the poorer classes a small sum for their attendance. This sum was originally an obolus, but after the time of Pericles it was raised to three. According to the usual order the proceedings of an ecclesia were commenced by a recitation or ceremonial purification of the place of assembly. The victims sacrificed were usually sucking pugs, whose blood was sprinkled round the boundary of the assembly. The crier next offered up a prayer to the gods for guidance, after which the business for which the assembly had been convened was introduced. According to the laws of Solon, the crier first called upon citizens above fifty years of age to speak and then upon all others, but this distinction was afterwards abolished, and the discussion was open from the commencement to all citizens of whatever age. The vote was generally taken by show of hands. In certain special cases, however, such as those affecting individual rights, the balloting was used. The decision to which the assembly came was called a paeplokuma. The ecclesia was sometimes adjourned from one day to the next, and it generally broke up at once if any of those present declared that he had seen an unapproachable one or if anything like excitement occurred. The word ecclesia came to mean any assembly regularly convened, and in New Testament Greek it is used to denote the assembly of Christians in any particular place, or the Christian church.

ECCLESIAS. The Book of, or, has been handed down by Hebrew tradition as one of the three canonical books of Solomon, son of David, the other two being Proverbs and the Song of Songs, or Canticles.

Two different practices have obtained from time immemorial as to the position of this book in the Bible. According to one, which is preserved in the MSS. and editions of the Septuagint, and is followed by the MSS. and editions of the Vulgate, Ecclesiastes is the second in the order of the five books which, according to the Alexandrian Jews and the Greek and Latin churches, was written by Solomon. The order of these five books in the Alexandrian and Sinaitic Codices and in the MS. Bible of Charles the Bold, circa 850 (British Museum) is Proverbs, Ecclesiastes, Canticles, Wisdom, and Ecclesiastes. According to the other practice the book in question is separated from those which are supposed to belong to the same author, and

3. Ecclesiasticus is generally referred to the other four Megilloth.

Thus in the oldest dated MS. of the entire Hebrew Bible yet known (1009), now in the imperial library of St. Petersburg, it is the third of the five Megilloth, viz., Ruth, Canticles, Ecclesiastes, Lamentations, and Esther. Though this order is also to be found in the Spanish and Italian MSS., it is by no means universal. Additional MS. 15,350 of the British Museum not only puts Ecclesiastes before Canticles, but places Ruth before the Psalms. In the fourteen pre-Reformation German translations of the Bible (1462-1518), and in Wycliffe's English version, where the five Solomonic books are still kept together, the order of the Septuagint and Vulgate is followed, as is also the case in the English Catholic version (Donah, 1610). Luther, who was the first to remove Wisdom and Ecclesiasticus from this group, and place them with the other so-called Apocryphal books at the end of the Old Testament, has left Ecclesiastes as second in the order of the Solomonic writings. In our first English translation of the entire Bible (1535) Coverdale followed the example of the great Continental Reformer. Hence this narrower group and this position of Ecclesiastes in the succeeding English Bibles, and in the present Authorized Version.

There is hardly another book in the Bible which has called forth so many commentaries and suffered as much at the hands of expositors as Ecclesiastes. Nearly 350 years ago Luther remarked,—"Difficult as this book is, it is almost more difficult to clear the author of the visionary fancies palpied upon him by his numerous commentators than to develop his meaning." What would this sagacious Reformer have said if he could have seen the countless speculations of which it has been the subject since his days? We are positively assured that the book contains the holy incantations of Solomon, together with a prophetic vision of the splitting up of the royal house of David, the destruction of the Temple, and the Captivity, and are equally assured that it is a discussion between a refined sensualist and a sober sage Solomon publishes in it his repentance, to glorify God and to strengthen his brethren, he wrote it "when he was inquired and scolded during his amours and idolatry." "The Messiah, the true Solomon, who was known by the title of son of David, addresses this book to the saints," a prodigate who wanted to disseminate his infamous sentiments palpied upon Solomon. It teaches to despise the world with all its pleasures, and flee to monasteries, it shows that sensual gratifications are men's greatest blessing upon earth. It is a philosophic lecture delivered to a literary society upon topics of the greatest importance, it is a medley of heterogenous fragments belonging to various authors and different ages. It describes the beautiful order of God's moral government, showing that all things work together for good to them that love the Lord, it proves that all is disorder and confusion, and that the world is the sport of chance. It is a treatise on the sumum bonum, it is "a chronicle of the lives of the kings of the house of David from Solomon down to Zedekiah." Its object is to prove the immortality of the soul, its design is to deny a future existence. Its aim is to comfort the unhappy Jews in their misfortunes; and its sole purport is to pour forth the gloomy imaginations of a melancholy misanthrope. It is intended "to open Nathan's speech (1 Chron. xvii.) touching the eternal throne of David," and it propounds by anticipation the modern discoveries of anatomy and the Harveyan theory of the circulation of the blood. "It foretells what will become of man or angels to eternity;" and, according to one of the latest and greatest authorities, it is a keen satire on Herod, written 8 B.C., when the king cast his son Alexander into prison.1

1 For an historical account of the interpretation of Ecclesiastes, with detached specimens of these "interpretations," see Gustav, "Commentary on Ecclesiastes," pp. 27-32, London, 1861.
One of the causes which have contributed to obscure the design of this book is the name Ecclesiastes. This title, which derives from Solomon, is an echo to theOld Testament, has been given by it to the Septuagint and Vulgate in accordance with a Jewish tradition, and has been adopted alike by the pre- and post-Reformation authorized versions of the Scriptures. The Jewish tradition in question is to be found in the Midrash Rabba on Eccles. i. 1, where we are told that "Solomon was called Coheleth = Ecclesiastes, because his discourses were delivered in the Cahal = Ecclesia." Hence the title in the Alexandrian version, which was followed by the Latin Authorized Version, and is reproduced by Wycliffe's Bible "the boe of Ecclesiastes, that is to say, boe of talker to the people." Hence, too, Luther's title Prediger, which is followed in our first printed English Bible "the boke of the Preacher, otherwise called Ecclesiastes" (Coverdale, 1535), and which is perpetuated in our Authorized Version. This title, however, is contrary to the grammatical form of the word Coheleth, as well as to the usage of the root of which it is derived. It has arisen from a desire on the part of the Jewish synagoge to exhibit Solomon in the garb of a penitent confessing his sins, and, by detailing his bitter experience, warning the people publicly to avoid the thorny path he has pursued and walk in the ways of righteousness. Lastly, the desire is to perpetuate the historical-sacred import of the book, and is contradicted by the signification of the name.

Coheleth is the participle feminine Kal of kāhāl, which primarily means to call, to call together, to collect, to assemble. The verb occurs about forty times in the Hebrew Bible, and is invariably used for assembling or gathering people together, especially for religious worship. Hence the name means a collection, or an assemblage of people into the presence of God, a female gatherer or an assembly to God. This meaning of the name is fully confirmed by another Jewish tradition, which is embodied in the Midrash Yalkut (Eccles. i. 1), and is exhibited in the ancient Greek versions of Aquila and Symmachus. Chapter 1. 12 tells us that Solomon is meant by this designation, since he was the only son of David, who was king over Israel in Jerusalem. The feminine and symbolic allusion arises from the fact that in chapter v. 27 of this very book Solomon is described as personified Wisdom, which appears in Eccl. iv. 10, vili. 1, &c., as Coheleth, or the female gatherer of the people. This symbolic name is, moreover, intended to indicate the design of the book itself, and to connect Solomon's endeavours here with his work recorded in i. Kings viii. Solomon, who in i. Kings vii. is described as gathering (kōpher) the people to hold communion with the Most High in the place which he erected for this purpose, is here again represented as the gatherer (rēvar) of the far-off people of God. As he retains his individuality, he sometimes describes his own experience, and sometimes utters the words of Wisdom, whose organ he is.

The design of this book, as indicated in the symbolic title of its hero, is to gather God's people, who were led astray by the inexplicable difficulties in the moral government of the world, into the community of God. Coheleth shows them the utter insufficiency of all human efforts to obtain real happiness—that it cannot be secured by wisdom, pleasure, industry, wealth, and prudence, but that it consists in the calm enjoyment of our lot, in resignation to the dealings of Providence, in the service of the Most High, and in looking forward to a future state of retribution, when all the present mysteries shall be solved, and when the Righteous Judge shall render to every man according to his deeds, whether they be good or evil.

Instead of writing an elaborate metaphysical disquisition to refute the various systems of happiness which the different orders of mind and the different temperaments had constructed for themselves, Coheleth introduces as narrating his painful experience in all his attempts. He shows how he had vainly striven to divert the longings of his soul by various experiments, and the only solution which can pacify the perplexed mind when contemplating the unhonourable dealings in the moral government of the world.

The theme or problem of the book is given in chapter i. 2–11. On the assumption that there is no hereafter, and that the longing soul is to be satisfied with the things here, Coheleth declares all human efforts to satisfy the longings of the soul to be utterly vain (chap. i. 2), since conscious man is more deplorable than unconscious nature, for he must speedily quit this life, whilst the earth abides for ever (4); the objects of nature depart and retrace their course again, but man disappears and is for ever gone (5–11).

In corroboration of the allegation in the prologue, and to show the utter failure to satisfy the cravings of the soul with mere temporal pleasures, Coheleth tells us that, with all the resources of a great monarch at his command (chap. i. 12), he applied himself assiduously to discover by the aid of wisdom the nature of earthly pursuits, and found that they were fruitless (13–14), since they could not alter destinies. Hence, when he reflected upon the large amount of wisdom which he had acquired, he came to the conclusion that it is utterly useless (16–17), for the accumulation of it only increased his sorrow and pain (18). Wisdom having failed, Coheleth resolved to try pleasure, to see whether it would yield the desired happiness, but he soon found that this too was vain (chap. ii. 1), and hence denounced it (2). After procuring every imaginable pleasure (3–10) he found that it was utterly insufficient to impart lasting good (11). He then compared wisdom with pleasure, the two experiments he had made (12); and though he saw that the former had a decided advantage over the latter (13, 14a), still he also saw that it does not except its possessor from death and oblivion, but that the wise man and the fool must both die alike and be forgotten (14b–16). This melancholy thought made him hate both life and the wealth which he had acquired by wisdom and industry, and, which, to aggravate matters, he perceived might lead to a reckless folly (17–21). It convinced him that man has nothing from his toil but wearisome days and sleepless nights (22, 23), and that there is therefore nothing better for man than to enjoy himself (24a). Soon, however, he found that this too is not in the power of man (24b, 25). God gives this power to the righteous and withholds it from the wicked, and it is after all only transitory (25).

Having shown the failure of wisdom, knowledge, and enjoyment to calm the distracted mind which broods over the problem that, whilst the objects of nature depart and retrace their steps, again man vanishes and is for ever forgotten, Coheleth now shows the vain efforts of industry to satisfy the restless longings of the soul. All the events of life are immutably fixed (chap. iii. 1–8); labour is therefore fruitless (9). Even the regulations to human labour which God has prescribed in harmony with this fixed order of things man in his ignorance often mistakes (10, 11). Nothing is therefore left but the enjoyments as one finds them. But this, too, as has already been shown, is a gift of God (12, 13), who has fixed everything to make man feel his utter dependence on and fear the Lord (14, 15).

The success of the wicked does not militate against this conclusion, for there is no right order of things (16, 17). But even if all terminates here, and man and beast have the same destiny (17–21), this only shows all the more that the enjoyment of life is our only portion
The wisest and most painstaking Coheleth found by experience that all human efforts to obtain real happiness are vanity of vanities (xii, 8-10), that the sacred writings alone contain the clue to it (11, 12), that there is a Righteous Judge who takes cognizance of all we do, that He will in the great Day of Judgment try the conduct of us all, and that we are therefore to fear Him and keep His commandments (13, 14).

From this analysis of its contents it will be seen that the book consists of four parts, with a prologue and epilogue. The prologue and epilogue are distinguished by respectively beginning with the same phrase (i, 1, 8) and ending with two marked sentences (i, 11, xii 14). The prologue, which consists of chapter i. 1-11, propounds the grand problem of the book, whilst the epilogue, which consists of chapter xii. 8-12, gives the solution proposed by Coheleth. The four sections, which are respectively indicated by the recurrence of the same formula or refrain, viz., ii. 26, v. 19, and xiv. 15, give the result of each experiment or group of efforts to satisfy the cravings of the longing soul, apart from the conclusion at which Coheleth arrived.

Coheleth fills up a gap in the Old Testament lessons throughout the Hebrew Scriptures virtue and vice are spoken of as being visibly rewarded on earth. God declares at the very opening of the law that He will show mercy to thousands of those who love Him and keep His commandments, and visit the misfortune of those who hate Him to the third and fourth generation (Exod. x. 5, 6).

The whole of Lev. xxvi. and of Deut. xxviii. are replete with promises of earthly blessings to those who will walk in the way of the Lord, and threatenings of temporal afflictions upon those who shall transgress His law. The faithful fulfillment of these promises and threatenings in the early stages of the Jewish history confirmed every Israelite that "God judgeth the righteous, and God is angry with the wicked every day," and afforded a source of consolation to which the righteous resorted when the power of the wicked threatened destruction (1 Sam. xiv. 13-16, xxi. 23, Ps. vii. ix, ixi) Like a net of thin threads is this doctrine spread over the entire Old Testament (comp. Ps. xvii. 1, 2, xxvi. 1-2, xxvii. 1-3, xxxv. 7-9, Is. 20-24, Jer. 24; Ezek. xxxv. 2-3, xxxvii. 1-3, xxxvii. 1-3, Ezek. ix. 7-9, Jer. 8-17, Malachi ii. 17). By limiting this bar of judgment to this side of the grave, the Old Testament yielded no explanation of, or succour under, the great night of the righteous suffering all their life, and then dying for their righteousness, and of the wicked prospering and prolonging their days through their wickedness. It was under such despairing circumstances that Psalms xxxvii. xix. and lixiv. were written. But these very Psalms endeavour to allay the prevailing scepticism in the moral government of God, by declaring that the righteous shall ultimately prosper and prolong their days upon the earth, and that the wicked shall suddenly be cut off in great misery. Hence the recurrence of this perplexity passing over into despair when these reassurances and consolations were not realized by experience, and when the sufferers, however conscious of their innocence, were looked upon as rejected of God in consequence of some secret sin. The book of Job, which so successfully combats the latter notion by showing that afflictions are not always a proper test of sin committed, only confirms the old opinion that the righteous are visibly rewarded here, inasmuch as it represents their calamities as transitory, and Job himself as restored to double his original wealth and happiness in this life.

Under the Persian and Ptolemaean dominion over Palestine, the political affairs of the Jews were such as to render the incongruity between the destinies of men and
their morals still more striking. Hence people began to
arrange the character of God.

“Every one that doeth evil
Is good in the sight of Jehovah, he delighteth in them,
Or where is the God of justice?”—Eccl. 7. 17.

“...it is vain to serve God,
And what profit is it that we keep his ordinances
And be thankful before Jehovah of Hosts?
For now we pronounce the proud happy;
They that work wickedness are built up;
They that tempt God are delivered.”—Mal. ii. 17, 18.

Under these circumstances, when the inheritance of the
Lord, which was to be the praise and the ruler of all the
earth, was reduced and degraded to the rank of a mere
province; when her inhabitants were groaning under the
extortions and tyranny of hirelings; when her seats of
justice were filled by the most vassal and corrupt men
(Ecc. v. 16); when might became right, and the
impunity and success with which wickedness was practised
swelled most alarmingly the ranks of the wicked
(viii. 10, 11); when the cherished faith in temporal retribution
was utterly subverted by the melancholy experience of the
reversion of destinies; when the longing minds of the
desperate people, released from the terrors of the law,
began to import as well as to construct philosophic systems
to satisfy their cravings (xiv. 12), and to resort to various
other experiments to obtain happiness, Coheleth disclosed
a new bar of judgment in the world to come. There
the Judge of the quick and the dead will rectify all the
inequities which take place here.

On the Continent, where Biblical criticism has been cul-
tivated to the highest degree, and where Old Testament
exegesis has become an exact science, the attempt to prove
that Solomon is not the author of Ecclesiastes would be
viewed in the same light as adding facts to demonstrate
that the earth does not stand still. In England, however,
some scholars of acknowledged repute still adhere to the
Solomonic authorship. Their principal argument is that
the unanimous voice of tradition declares it to be so. We
at once concede the fact. The Jewish synagogues univer-
sally believed that Solomon wrote Canticles while young,
Proverbs when in middle life, and Ecclesiastes in his old
age (Midrash TaHkut, Eccl. i. 1), and the Christian church
has simply espoused the Jewish tradition. But with all
due deference, we submit that tradition has no authority
whatever to determine points of criticism. It is an
acknowledged fact that the ancient Jews and Christians, and
indeed the leaders of thought to the
beginning of the 16th century, had not the slightest
appreciation of peculiarities of style. The different shades
of meaning in which the same expression is used by
different authors, the variations in forms, phrases,
constructions, and sentences which obtained at diverse periods,
and which supply definite data to philologasts, and have
been reduced to a science in modern days, began only to
be noticed at the time of the Reformation, when the vital
power of criticism was first applied to traditional dogmas.
The spell of tradition once broken, thinking men soon
began to recognize the literary style and the respective
artistic merits of the component parts of the Bible. Hence
Luther already declared, “Solomon did not write the book
of Ecclesiastes; it was compiled by Sirach, at the time of the
Macabeans. . . . It is, like the Talmud, made up of many
books, which perhaps belonged to the library of
King Ptolemy Eupator in Egypt.”

No impartial student, with even a moderate knowledge of the genius of the
Hebrew language, can fail to see the striking difference
in the style of the pre- and post-exile books of the Old Testa-
ment. In the case of Ecclesiastes the difference is still
more unmistakable. Of the vocabulary and phrases in
Ecclesiastes a part is to be found in the post-Babylonian
biblical writings, and that only in the Chaldean portions;
whilst another part has no parallel in the Bible, but is only
to be met with in the Mishna, the Talmud, and other post
biblical productions. Unless, therefore, it is maintained
that the Hebrew of the Bible, which extends over a period
of several thousand years, and purports to exhibit the styles
of a number of writers who lived in different districts, is
unlike any other known literary language, that it had no
development and no epochs in its literature, the striking
Rabbinic complexity of Ecclesiastes must assuredly stum
at the latest composition in the Old Testament. Those
who know the vast orthodoxy of the eminent Hebrew
scholar, Professor Delitzsch, will feel theconvincing power
of this fact when they find that he assigns to Ecclesiastes
the latest date of any book in the Hebrew Bible, because
it is written in this unquestionably late language.

We have abstained from adducing any other arguments derived
from its contents, because this appears superfluous. An
intelligent reader even in the English translation can see
that the representation of Coheleth as indulging in sensual
enjoyments and acquiring riches and fame in order to
determin what is good for the children of men (chap.
8, 9); and the leaders of thought to the
development and no epochs in
biblical writings, and that only in the Chaldee
period of the
book, that the complaint about the multiplication
of profane literature (chap. xii. 12) could only have been
made at a time when the Jews became acquainted with the
Greek writings and Alexandrian philosophy. The book,
however, is of Palestinian origin, as is evident from the
frequent allusion to rain (vii. 12–20), which does not fall
in Egypt; the reference to the Temple and its worship
(v. 7); and the mention of “the city” (vii. 10), though,
from the remark הַשֵּׁבָּה in the city (v. 7), it would
seem that the writer did not live in Jerusalem itself but in
the neighbourhood.

From the records we possess of the discussions on the
Hebrew canon we see that at the synod at Jerusalem, circa
65 A.D., and at a subsequent synod in Yabne, circa 90
A.D., the question was still an open one whether Ecclesiastes
was canonical. The school of Shammait then deemed
against its canonicity, whilst the school of Hillel passed it
as canonical (Mishena Yadaot, iii. 5, iv. 6; Edershein,
39). The reasons assigned for its rejection from the
Talmud, are that chap. ii. 5, iii. 5, and vili. 5 contradict
each other, and that the book does not exhibit any signs
of its being inspired (Sabbath 30 b, Megillah 7 a).
According to the Midrash Rabba on Eccl. xi. 9, the advice
to enjoy sensual pleasures was considered as contradicting
of Moses (comp. Eccl. xi. 9 with Numb. xv. 39) and
inclining to heresy. The admonition, however, to fear God
and the doctrine of a future judgment were urged in its
favour and ultimately prevailed. The sages showed that
the contradictions were apparent only, and the book was
declared canonical.—(Both of St. Nathan, cap. i.) Hence it
passed over into the Christian church as part of the canon.

Literature.—The most important commentaries on Ecclesiastes
which furnish the best materials for forming an independent opinion
on this strangely difficult book are—Knobel, Commentarius über das Buch
Koheleth, Leipzig, 1836; Ewald, Kohelet, in Das kleine, Aller
Bunde., 2d ed. vol. u. 267, kct., Gottingen, 1807; Hitzig, Der
Prophet Solomon im Kulturzustande jehovitischer Handbuch zum alten
Testament, vol. iv., Leipzig, 1877; and the Commentary
Ecclesiastes, New York, 1851. Elster, Commentarius über den Prediger,
Göttingen, 1855; Graetz, Koheleth, Leipzig, 1871; Delitzsch,
Habakkuk und Koheleth, Leipzig, 1873. The latest two
volumes are the post-Sinaitic edition of the book. For
the history of the interpretation see Ginsburg, Coheleth, commonly called the
Book of Ecclesiastes, London, 1861. (C. D. G.)
ECLESIASTICAL COMMISSION. This is a standing commission invested with very important powers, under the operation of which extensive changes have been made in the distribution of the revenues of the Church of England. It was one of the results of the vigorous movements for the reform of public institutions which followed the Reform Act of 1832. In 1833 two commissions were appointed "to consider the state of the several dioceses of England and Wales, with reference to the amount of their revenues and the more equal distribution of episcopal duties, and the prevention of the necessity of attaching by commendam to bishoprics certain benefits with cure of souls; and to consider also the state of the several cathedral and collegiate churches in England and Wales, with a view to the suggestion of such measures as might render them conducive to the efficiency of the established church, and to provide for the best mode of providing for the cure of souls, with special reference to the residence of the clergy on their respective benefices." And it was enacted by 5 and 6 Will. IV. c. 30 that during the existence of the commission the profile of dignitaries and benefices without cure of souls becoming vacant should be paid over to the treasurer with the approbation of Queen Anne's Bounty. In consequence of the recommendation of these commissions, a permanent commission was appointed by 6 and 7 Will. IV. c. 77, for the purpose of preparing and laying before the king in council such schemes as should appear to them to be best adapted for carrying into effect the alterations suggested in the report of the original commission and rected in the Act. The new commission was constituted a corporation with power to purchase and hold lands for the purposes of the Act, notwithstanding the statutes of mortmain. The first members of the commission were the two archbishops and three bishops, the lord chancellor and the principal officers of state, and three laymen named in the Act. By a later Act (3 and 4 Vict. c. 113) all the bishops, the deans of the three courts at Westminster, the master of the Rolls, and the judge of the Prerogative Court and Court of Admiralty, and the deans of Canterbury, St. Paul's, and Westminster were added to the commission, and power was given to the crown to appoint four, and the archbishop of Canterbury to appoint two additional lay commissioners. The lay commissioners are required to be "members of the United Church of England and Ireland, and to subscribe a declaration to that effect: " Five are a quorum, but two bishops at least must be present at any proceeding under the common seal of the commission, and it only two are present they can demand its postponement to a subsequent meeting. Members of the court of consistory, under the title of church estates commissioners, are also appointed—two by the crown and one by the archbishop of Canterbury. These three are the joint treasurers of the commission, and constitute, along with two members appointed by the commission, the church estates committee, charged with all business relating to the sale, purchase, exchange, letting, or management of any lands, tithes, or hereditaments. The commission has power to make inquiries and examine witnesses on oath. The schemes of the commission having, after due notice to persons affected thereby, been laid before the queen in council, may be ratified by orders, specifying the times when they shall take effect, and such orders when published in the London Gazette have the same force and effect as Acts of Parliament.

The recommendations of the commission recited in 6 and 7 Will. IV. c. 97 are too numerous to be given here. They include a revision of the dioceses, equalization of episcopal income, providing residua, &c. By 3 and 4 Vict. c. 113 the fourth report of the original commissioners, dealing chiefly with cathedral and collegiate churches, was carried into effect, a large number of canons being suspended, and some benefices and dignities suppressed.

The encllosures of these suppressed or suspended offices, and the surplus income of the episcopal sees, constitute the fund at the disposal of the commissioners. By 33 and 34 Vict. c. 124, on the surrender of any canonries, or archidiaconies, all the land and emoluments of the sees, except the patronage and lands attached to houses of residence, become, by Order in council, vested in the commissioners, who may, however, reserve the same as much as may be sufficient to secure the net annual income named for it by statute or charter. All the profits and emoluments of the suppressed canons, &c., are paid over to the commissioners, as well as the separate estates of those benefices and canons which are not suspended by this fund the canons of the see are to be paid, and the residue is to be devoted to increasing the efficiency of the church by the augmentation of the smaller bishoprics and of poor living, the endowment of new churches, and employment of additional ministers.

The substitution of one central corporation for the many local and independent corporations of the church, so far at least as the management of property in concerned, was a constitutional change of great importance, and the effect of it has undoubtedly been to correct the anomalous distribution of ecclesiastical revenues by equalizing incomes and abating salaries. At the same time it is regarded as having made a serious breach in the legal theory of ecclesiastical property. "The important principles," said Gibbes, "on which the inviolability of the church establishment depends, that the church generally possesses no property as a corporation, or which is applicable to general purposes, but that such property is a part of the ecclesiastical corporation, whether aggregate or sole, has its property annexed, distinct, and maintained. The adaption of the original endowment, was given up without an effort to do it." (Law Entitled to the Church and Clergy, p. 40)

ECLESIASTICAL LAW generally means the law of the church, in countries where an established religion is recognized by the state, but in a more general sense it would include the whole body of the law relating to religion. It is in this sense that the phrase is used by American lawyers, and it is only in this sense that it can be used of Ireland since the disestablishment of the state church in that country. The relation of the church to the rest of the law, especially in respect of legislation and judicature, is one of the most important points in the constitution of a country. Where the Roman Catholic religion is recognized by the state, the jurisprudence of the canon law prevails, but the relations between the Papal See and the state are governed by special conventions, or concordats. See Canon Law.

The ecclesiastical law of England is remarkable for its complete dependence upon the authority of the state. The Church of England cannot be said to have a corporate existence nor even a representative assembly. The Convocation of York and the Convocation of Canterbury are provincial assemblies possessing no legislative or judicial authority. The ecclesiastical judicatures are for the most part Officers by laymen, and the last court of appeal is the Judicial Committee of the Privy Council. In like manner changes in the ecclesiastical law are made directly by Parliament in the ordinary course of legislation, and in point of fact a very large portion of the existing ecclesiastical law consists of Acts of Parliament.

The sources of the ecclesiastical law of England are thus described by the leading text-writer on this subject 1—"The ecclesiastical law of England is compounded of these four main ingredients—the civil law, the canon law, the common law, and the statute law. And from these, digested in their proper rank and subordination, to draw out one uniform law of the church is the purport of this book. When these laws do interfere and cross each other, the order of preference is this—The civil law submitted to the canon law, both of these to the common law, and all three to the statute law. So that from any one or more of them, together or from all of them without attending to their comparative obligation, it is not possible to exhibit any distinct prospect of the English ecclesiastical constitution." Under the head of

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1 The Ecclesiastical Law, by Richard Burn, LL.D.
statute law. Burn includes 'the Thirty-nine Articles of Religion,' agreed upon in Convocation in the year 1562; and in like manner the Rubric of the Book of Common Prayer, which, being both of them established by Acts of Parliament, are to be esteemed as part of the statute law.'

The first principle of the ecclesiastical law is the assertion of the supremacy of the crown, which in the present state of constitution means the same thing as the supremacy of Parliament. This principle has been maintained ever since the Reformation. Before the Reformation the ecclesiastical supremacy of the Pope was recognized, with certain limitations, in England, and the church itself claimed some pretensions to ecclesiastical freedom. The freedom of the church is, in fact, one of the standing provisions of those charters on which the English constitution was based. The first provision of Magna Charta is quod ecclesia Angli-
cana libera sit. By the various enactments of the period of the Reformation the whole constitutional position of the church, not merely with reference to the Pope but with reference to the state, was definitely fixed. The legislative power of Convocation was held to extend to the clergy only, and even to that extent required the sanction and assent of the Crown. The common law courts controlled the jurisdiction of the ecclesiastical courts, claiming to have "the exposition of such statutes or Acts of Parliament as concern either the extent of the jurisdiction of these courts or the matters depending before them." And therefore if these courts either refuse to allow these Acts of Parliament, or expound them in any other sense than is truly and properly the meaning of the words used, the whole construction of common law may prohibit and control them.

The design of constructing a code of ecclesiastical laws was entertained during the period of the Reformation, but never carried into effect. It is alluded to in various statutes of the reign of Henry VIII., who obtained power to appoint a commission to examine the old ecclesiastical laws, with a view of deciding which ought to be kept and which ought to be abolished; and in the meantime it was enacted that "such canons, institutions, ordinances, synodal or provincial or other ecclesiastical laws or jurisdictions spiritual as be yet accustomed and used here in the Church of England, which necessarily and conveniently are requisite to be put in use and execution for the time, not being repugnant, contrary, or derogatory to the laws or statutes of the realm, or to the prerogatives of the royal crown of the same, or of any of them, shall be occupied, exercised, and put in use for the time within this realm." (35 Henry VIII. c. 1.)

The work was actually undertaken and finished in the reign of Edward VI. by a sub-committee of eight persons, under the name of the Reformatorio Legum Ecclesiasticarum, which, however, never obtained the royal assent. Although the powers of the 35 Henry VIII. c. 1., were revived by the 1 Elizabeth c. 1, the scheme was never executed, and the ecclesiastical laws remained on the footing assigned to them in that statute,—so much of the old ecclesiastical laws might be used as had been actually in use and was not repugnant to the laws of the realm.

The statement is, indeed, made by Sir R. Phillimore that the "Church of England has at all times, before and since the Reformation, claimed the right of an independent church in an independent kingdom, to be governed by the laws which she has deemed it expedient to adopt." This position can only be accepted if it is confined, as the authorities cited for it are confined, to the resistance of interference from abroad. If it means that the church is distinguished from the kingdom, has claimed to be governed by laws of its own making, all that can be said is that the claim has been singularly unsuccessful. From the time of the Reformation no change has been made in the law of the church which has not been made by the king and parliament, sometimes indirectly, as by confirming the resolutions of Convocation, but for the most part by statute. The list of statutes cited in Sir R. Phillimore's Ecclesiastical Law fills eleven pages. It is only by a kind of legal fiction that the church can be said to have deemed it expedient to adopt these laws.

The terms on which the Church Establishment of Ireland was abolished by 32 and 33 Vict. c. 42 may be mentioned. By sec. 20 the present ecclesiastical law is made binding on the members for the time being of the church, "as if they had mutually contracted and agreed to abide by and observe the same," and by sec. 21 it is shown that the ecclesiastical courts shall cease after 1st January 1871, and that the ecclesiastical laws of Ireland, except so far as relates to matrimonial causes and matters, shall cease to exist as law.

ECCLESIASTICUS. See APOCRYPHA.

ECHIDNA, or PORCUPINE ANT-EATER (Echidna hornata), one of the four known species of Monotremata, the lowest order of Mammalia. It is a native of Australia, where it chiefly abounds in New South Wales, inhabiting rocky and montaneous districts, where it burrows among the loose crevices of rocks. In size and appearance it bears a considerable resemblance to the hedgehog, its upper surface being covered over with strong spines directed backwards, and on the back inwards so as to cross each other on the middle line. The spines in the neighbourhood of the tail form a tuft sufficient to hide almost rudimentary organ. The head is produced into a long tubular snout, covered with skin for the greater part of its length. The opening of the mouth is small, and from it the echidna puts forth its long slender tongue, lubricated with a viscid secretion, by means of which it seizes the ants and other insects on which it feeds. It is an entirely destitute of teeth. In its other agreeable form, with its broad feet and large solid nails, powerful burrowing organs In common with the other monotremes, the male echidna has its heel provided with a sharp hollow spur, connected with a secreting gland, and with muscles capable of pressing the secretion from the gland into the spur; but as the animal has never been observed to use this in defending itself, the spur probably serves some other purpose than that of offence or defence. It is a nocturnal or crepuscular animal, generally sleeping during the day, but showing considerable activity by night. When attacked it seeks to escape either by rolling itself into a ball, its erect spines proving a formidable barrier to its capture, or by burrowing into the sand, which its powerful limbs enable it to do with great celerity. "The only mode of carrying the creature," says Bennett (Gatherings of a Naturalist in Australasia) "is by one of the hind legs, when it may be removed to any place with great facility, for an attempt to seize it by any other part of the body, from its powerful resistance and the sharpness of the spines, will soon oblige the captor to relinquish his hold." They are exceedingly restless in confinement, and constantly endeavour by burrowing to effect their escape. From the quantity of sand and mud always found in the alimentary canal of the echidna, it is supposed that these ingredients must be necessary to the proper digestion of its insect food. The only other members of this family are the Short-spined Echidna (Echidna setosa), confined to Tasmania, and differing from the former species chiefly in the shortness of its spines, which are nearly hidden by the long hair of fur, and the Echidna Bruijni—a new species discovered in 1877 in the mountains on the north-east coast of New Guinea, at an elevation of 3500 feet. By many naturalists the generic term Echidna has lately been abandoned in favour of Tachyglossus of Illiger.
Echinodermata

Echinodermata (from ἕχον, a hedgehog or sea-urchin, and δέρμα, skin,) a class of marine animals which constitutes with the class Scelentera the sub-kingdom Annelidea of Haeckel, or, according to some authorities, is a distinct sub-kingdom of the Invertebrata. Familiar examples of the Echinodermata are the Sea-urchins, Star-fishes, Feather-stars, and Sea-cucumbers of the coasts of Britain. The characteristics of the group may be briefly summarized thus. The adult presents a more or less marked, although never perfect, radial symmetry of parts; the larva, in most instances, is bilaterally symmetrical. The perisome or derma develops a calcareous skeleton of numerous interlocking plates or of detached plates or spicules. The muscular tissues consist chiefly of unstripped fibres. The intestinal canal, opening in a distinct anal aperture. An aqueous or ambulacral system of organs, regarded as homologous with the water-vascular system of the Scelentera, is generally present; and there is a nervous system consisting of a ganglionated circular or polygonal cord, which surrounds the mesentery, and sends off branches parallel with and superficial to the ambulacral canals. The sexes are in the majority of cases distinct, and the reproductive organs are generally placed symmetrically with respect to the radially disposed skeleton.

In all Echinodermata of which the life-history has been worked out, the larva, echinoplum, or, as it has been termed by Sir W.J. Thomson, the pseud-embryo, produced from the egg is, with but one or two exceptions, ovate, free-swimming, and provided with cilia, which become after a time confined to one or more bilaterally symmetrical bands running transversely or obliquely to the long axis of the body, and frequently borne on processes of the same. In the Asteroidea and Holothuroidea the larva is vermiform and devoid of skeleton; in the Echinoidea, it is plateform (Latin, platus, a pente-house, or breast-work), and has a continuous calcareous skeleton, passing into and affording support to the body processes. A stomach, with an oesophagus and intestine, which make with each other an angle open towards the ventral side of the body, is early developed in the Echinoderm larva. The peritoneal cavity and ambulacral system of vessels are developed from diverticula of the alimentary canal. A tube formed by the integument of the pseud-embryo to one side of the dorsal line may remain connected with the ambulacral system of the adult as the madreporic canal. In the Echinoidea, Asteroidea, Ophiuroidea, and Crinoidea, the body-wall of the adult is formed from the blastemata, the larval body, more or less of the intestine, and, when present, the skeleton are cast off or absorbed into the new organism, and another month appears in the centre of the circular vessel. It is by this peculiar metagenetic mode of development of the Echinoderm within its larva that the class Echinodermata is specially allied to the order Tubulifera and Testacea of the class Scelentera.

The Echinodermata may be divided into the following orders:—(1) Echinoidea, or Sea-urchins; (II) Asteroidea, or Star-fishes; (III) Ophiuroidea, or Sand-stars; (IV) Crinoidea, or Feather-stars; (V) Cystidea; (VI) Echinoasteridea; (VII) Blastocystidea; (VIII) Holothuroidea, or Sea-slug. Of these orders V, VI, and VII, have been extant since the Palæozoic period, by some authorities the Echinoasteridea are included with the Cystidea.

Order I.—Echinoidea.—The body in the Echinoidea is spheroidal, oval, discoid, or heart-shaped, and the shell, test, or perisome bears numerous spines. A common European type of the group is the species Psammechinus (Echinus, L.) esculentus (see fig. 1). In certain forms (Scutella) the test is perforated by slit-like apertures, and curiously lobed or digitate (fig 2). With few exceptions the test is a rigid structure of numerous plates united by their edges. In the Echnotheuridae, however (Calcearia, Phoramecina, and the ex-

tinct Echinotheuridae and Lepidocentra), and also in the Palæozoic genera Archaelaurus, Lepidocystidea, and Lepidocerus, the plates of the corona overlap, so as to resemble the peristomial plates of Calcearia.

The plates are composed of a dense calcareous network, consisting chiefly of calcium carbonate. As the test is invested with an epidermis, and is produced mainly by calcification of the mesoderm, it is to be regarded as an integument or endo-skeleton. In the typical Recent echinida the walls of the corona or main body of the shell, when freed from spines, are seen to consist of five zones or arcs, the ambulacra (Latin, ambulare, a walk), composed of double rows of pentagonal plates, and alternating with five other double rows, the interambulacra. In the Palæozoic forms, which constitute the sub-order Pericechinidea of McCoy, the interambulacrum is made up of more than two rows of plates, of which the intermediate and central are hexagonal in form (see figs. 3 and 4). In the genera Astoeides and Ophiopus there are extra ambulacral as well as interambulacral plates. The ambulacra, which
ECHINODERMA T

are usually narrower than the interambulacra, have near
their outer edge small shield-like spaces, _ambulacra_, bounded by
a more or less elevated wall, and perforated by pairs of
small orifices or pores for the protrusion of the feet or
pedicels, each pair of pores corresponding to one of the pore
plates—the primitive ossicles which commonly unite to
form the ambulacral plates. The ambulacra are either
homogeneous, i.e., composed of similar elements gradually
diminishing in size towards the poles of the test, or (as in the
_Spatangoida_ and most of the _Clupeasteroida_) are hetero-

geneous, having the upper portion petaloid in shape, and
the lower with pores scattered in areas not always confined
to the ambulacral plates, or arranged in ramifying fasciculi.
In the _Spatangoida_ the anterior unpaired ambulacrum is
commonly obsolete (see fig. 5). In the Oolitic genus

**FIG. 5.—Spatangoidea purpurascens.**

**FIG. 6.—Pedicellaria of**

**FIG. 7.—Echinoidea pur-

_Dipsaster_, the two postero-lateral ambulacra, forming the
_ambulacra_, are separate from the rest, and converge over the
anal opening; while the three anterior, the _truncum_, unite at the anal disk (see fig. 8). The growth of the
urchin in length is effected by the formation of new
plates at the apical end of the corona, and in breadth by additions to the margins of the plates. On the surface of
the plates are tubercles of different sizes, each with a
knob or elevation, sometimes crenulated, by which the
acetabulum of the spine is attached (see figs. 4 and 5).
The presence or absence in the tubercle of a central perforation for the passage of a ligament for the spine is an important
distinguishing character in various groups of fossil echinida. The
spines in the young state are dilated, like the plates of the
test; they are composed of a calcareous network, and are
penetrated and covered by the perisons, which contains the
muscular fibres by which they are moved. They are short in
the _Clupeasteroida_ and _Spatangoidea_, and of various
lengths in the _Echinoidea_, and offer a considerable diversity of
form and ornamentation. Dr Gray (Ann. of Nat. Hist.,
1844) mentions the discovery in Sicily of the fragment of
a spine of an echinus, the circumference of which was
nearly 1 1/2 inches, and the length more than 8 inches. In
_Porocidaris purpuracea_, a deep-sea form, the spines are
paddle-shaped, and very flat, and are serrate on the edges; in _Colobopora_
the long curved spines resemble the antennas of certain beetles. Scattered
over the surface of the test, and more especially on the oral membrane, are the
pedicellaria, generally regarded as peculiarly modified spines; these, when well
developed (fig. 6), consist of a long flexible stem, fur-

**FIG. 7.—_Echinoidea pur-

ished at the summit with a forceps of three pinces or
prongs, which snap together, and seize firm hold of
any object that comes in their way. They serve for the
removal from the neighbourhood of the shell of dirt of
all kinds, and apparently also for defence. _Ctenella
frequenta_ has pedicellaria with four valves. In some
_Spatangoidea_ genera the corona bears symmetrical hands of
minute tubercles with attached spines, the _sumneria_ or _fasci-
des_, distinguished, according to their position with re-
spect to the anus or to the apical or the marginal termina-
tions of the pedaloid ambulacra, as _sub-anal_, _circum-anal_,
_intropetalona_, and _peripetalona_. The spines on the _sum-
neria_ have a thick integumentary covering, and except at
the enlarged apex, are closely studded with cilia. Lovén has
shown the occurrence, in all Echinidea but _Culoria_, of
another kind of appendages of the test, possibly sensory
organs, to which he has given the name of _phaloria_.
These are button-like, sphaeroidal bodies, seldom above 1/3
inch in length, furnished with a short stalk, and normally
articulated with small projecting tubercles on the plates of
the ambulacra and peristome. Sometimes they become
concealed by a layer of the test, in which there remains
only a fine external fissure. At the summit or apical pole
of the test is a space occupied by the ocular and genital
plates, which in the _Echinidea_ (Endocyclica) encircle the
anus with its anal plates. The five genital plates, which are
opposite the interambulacra, or interradial in position,
are perforated by apertures for the exit of the reproductive
products. In the _Clupeasteroida_ and _Spatangoidea_ (Exo-
cyclica), in which the anus is eccentric, and exterior to the
apical disk, one of the genital plates is usually imperforate
(fig. 7). The five ocular plates are situated radially, crown-
ing the apical ends of the ambulacra; on the surface of each is a
depression, having a pore for an ocellus or eye-spot. Always,
except in the _Clupeasteroida_, the right antero-lateral genital plate,
or, in other words, that situated to the right of the anterior
ambulacrum of the trivium, is larger than the others, and bears the
convex, perforated _mandibulopetalous tubercles_ or _madro-
epetalous_. In the _Clupeasteroida_ this is most fre-

**FIG. 6.—Pedicellaria of

**FIG. 8.—_Echinoidea pur-

quently extended over the other apical plates. The hinder genital plate, with apparently
one exception, is wanting in the _Spatangoidea_, the place being
occupied by the madreporite. The Paleozoic _Echinidea_ differ from the modern forms by the greater number of
perforations of their ocular and genital plates. At the base
of the test is the mouth with its buccal membrane and plates.
The species _Lessina mirabilis_ (the type of the sub-family
_Lessinidae_, family _Spatangoidea_) has both mouth and anus
closed by converging triangular valves. In the _Echinidea_
_and Clupeasteroida_ the mouth is central in position, and
provided with teeth; in the _Spatangoidea_ it is eccentric and
edentulous. The teeth resemble those of Rodents in form,
and are arranged in hard wedge-shaped sockets or _alveoli_,
which by their union form a pentagonal cone. As the outer
substance of the tooth is harder than the inner, it is less
readily worn away, and thus always presents a sharp edge
Each alveolus is composed of two halves united in the
middle line, and each half, again, consists of a superior and
inferior portion. The alveoli are inter-radial in position,
or opposite the interambulacra. They are connected by
transverse muscular fibres, to alternate with superiorly
placed, thickish, radial structures, the _rotula_ or _folia_, which,
in the _Echinidea_, bear each a bifurcated piece, the _radus._
This skeletal mouth-apparatus is commonly known as
"Aristotle's lantern." The calcified internal arched processes termed "auriculae," at the oral end of the ambulacra in the Echinidea (of the interambulacra in Cidarida), regarded as homologous with the internal ambulacral ossicles of the Asteroidea and Ophiuroidea, are formed of two pieces from the top of the auricular pass retractor muscles to the outer edge of the alveoli. The oral skeleton is provided also with retractors proceeding from the alveoli to the lower interambulacral edge of the corona, besides special muscles connected with the radii. In the Clypeasteroida arched (in Cidarida unarched) processes are given off from the ambulacral plates, at the sides of the ambulacral canals; and in the Clypeasteroid genus Scutella, the dorsal and ventral walls of the corona are connected by vertical calcareous plates or trabeculae. None of the above-mentioned internal calcareous processes is developed in the Spatangoidea. The mouth communicates by a tortuous oesophagus with the stomach. The intestine forms a sort of tube on the inner side of the shell, and is attached to it by a tentacle.

Of the internal organs of the Echinidea the most important and characteristic are those constituting the ambulacral system. These are (1) a circular or slightly pentagonal vessel placed around and traversed by the oesophagus, on the inside of the alveoli, and between the nervous and blood-vascular systems, called either the vessel (absent in the Clypeasteroida and Spatangoidea), answering to the racemose appendages of the Holothurians; (2) the membranous or calcareous madreporic canal, termed also the sand-channel, which runs nearly vertically through the axis of the body, and, communicating with the exterior by the madreporic tube, supplies water to 1, 2, (4) vessels radiating from 1 along the parieties of the body, and opening eventually into basal sacs, or ampullae, proceeding from the canals of the pedicels shortly above their origin. In the vessels of the ambulacral system is contained a watery fluid stratified from the perivisceral cavity. The pedicels, which may vary considerably in shape, are tubular structures, usually terminated by a sucking disk, they have contractile, muscular walls, and are capable of being protruded beyond the extremities of the spines. They subserve locomotor, tactile, or branchial functions. The contractile perivisceral fluid is kept in motion in the cilia lining the lining membrane of the body and the viscera. Where modified pedicels or ambulacral gills are absent, as in the Echinidea, the Cidaridea excepted, a scarcity of that fluid is apparently promoted by branchial developments from the peritoneum, the hollow stems of which communicate with the body-cavity. The nervous system consists of a slender, pentagonal, red or violet hoop around the gutter, superficial to the circular ambulacral vessel, with five ganglia sending off as many cords, which pass in their course through the ambulacral pores, probably supplying the pedicels, spines, and pedicellariae, and terminate eventually in the pigmentated eyes-spots. The principal vessels of the pseud-hemal or blood-vascular system of the Echinidea appear to be two trunks, the one on the dorsal, the other on the ventral side of the alimentary canal, these, according to Hoffmann, communicate either directly or by a distinct trunk with the water-vascular ring.

From an examination of Echinus synurus, Pentamachus milleri, Teuthogena licida, and Amphiura corticata, Ferner determined that, as maintained by Hoffmann, the circulatory and nervous systems are identical, that the so-called "heart" is only a gland, which opens by a canal into a funnel-shaped space bounded by the lining membranes of the test and the madreporic, through which floats freely in the perivisceral cavity. Further, he found that the ambulacral vessels and their branches terminate blindly, the circulation consisting solely in a to-and-fro movement of their contents.

The reproductive organs are large racemose glands, situated beneath the upper termination of the interambulacra, and opening externally by the genital pores. The sexes are distinct. The spermatophores have vibratile filaments; the egg is fertilized after leaving the body of the female, and in about eight hours undergoes complete yolk-division.

The pseudo-embryo or echinoembryum, at first created and spherical, becomes after a time wedge-shaped, at its broad end to the mouth or pseudopore. Simultaneously with these the skeletal rods and calcified bands of the phalices begin to be produced. The development of the ambulacral system commences with the formation of a sac which lies to the left of the junction of the pseudo-embryonic gut and somach, and is prolonged into a canal opening by a pore at the oral end of the ambulacral system, the canal of the sac becomes the madreporic tube. The skeleton of the phalices separates, as development proceeds, into several pieces, and is by degrees discarded, while its process advance, and the body assumes the rounded form of the embryo within. Thus, however, in many cases to undergo similar important changes before its resemblance to the adult is complete. Thus in the young of species of Spatangoidea, the peritoneum is almost central, and is pentagonal in form. In the Echinidea, before the appearance of the anus in the embryo, its place is occupied by a single plate, the sub-anus, and the anus appears near its border, towards the posterior right ambulacrum. It lies within a circle formed by the imperfect peritonea, the future genital plates, and these again are surrounded by five imperforate oval plates, with intervening oval plates. The central anus, however, is sometimes arabulacral, such as Salenoida among the Echinidea. If it be considered as homologous with the dorsal-external plate of Monopora, or the basall of the cally in other Ophiuroidea, the genital plates correspond to the phalices, and the ocular to the first radials. The food of the Echinidea consists either of seaweed, and small shellfish and crustaceans, which are conveyed to the mouth by the pedicels, or, as in the case of the cuticular forms, of sand and earth containing nutritive material. In the species Aninura, one of the Us ELSE, Hoffmann discovered the presence of a muscular chamber at the apex of the test, containing embryonic in various stages of their growth. Certain species, observed by (Clypeasteridae, and Echinidea) have become at every egg-rolling for themselves: mainly the eggs of the echinoderms are a "remedy for the stone, and "filsms in horses' eyes." They are put to practical use in some countries as stone-penics.

Various systems of classification have been adopted for the Echinidea. In the following scheme the principal groups are arranged chiefly according to the position of the anal opening and the nature of the ambulacra.

Sub-order I — TESSULATA  Echinidea with interambulacral of more than two rows of plates.

Sub-order II — TYPICA Echinidea with interambulacral of but two rows of plates.

Group I — REGULARIA or ECHINOCYCLAE  Mouth central or subcentral, anus usually central and opposite the mouth, and never exterior to spiny disk.

A. Anus central

1. Shell round

Cidaridea  Tubercles smooth, pr-retractor, peritoneum notched, anal plates ten, aneurys inclosed, lateral branchial absent.

Dendroaster  Tubercles crassulate, pr-retractor, peritoneum notched, spines hollow. Allied forms are the fossil H. hennikeri.
Echinoidea

Arbocidate Tubercles smooth, imperforate, four large anal plates, usually closed.

Echidnae Tubercles imperforate, or perforate and crenulate, anal plates numerous, pairs of pores in ranks of four, six, or more.

ii. Shell oval or elliptical.

Echinoidea. Pores in ranks of five or six pairs.

B. Anus eccentric through intervention of one or several supernumerary anal plates.

Solasteridae All fossil forms, with exception of the genus Scoloplos.

Group II.—Irregularia or Eocyclidea. Anus eccentric, not within the anal disk.

A. Ambulacra simple, not petaloid

Galeridae Mouth central; shell globular or sub-pentagonal; a single apex at which the ambulacra converge.

Dysasteridae Mouth eccentric, shell ovate or heart-shaped, two spaces, at which the lamina and trivium respectively converge.

B. Ambulacra more or less petaloid.

1. Dental apparatus present.

Glyposasteridae Shell more or less flattened, sub-pentagonal.

Sulcidae Shell depressed, discoidal, often digitate or perforated, lower surface with ramifying grooves.

ii. Dental apparatus absent.

Culcubidae Mouth central or nearly so; perisome sub-pentagonal.

Spirasteridae Mouth eccentric, transverse or reniform.

To the group Regularia must be added the Cretaceous and Recent family of Echinoidea. The Echinoidea are represented in Paleozoic rocks by the sub-family Echinothuriidae, the group Echinoidea, and the order Echinidea. The most important and characteristic genera of the Echinoidea are Echinothrus and Echinothurea.

The Echinoidea is a group of marine invertebrates, primarily echinoderms, known as sea stars. These animals are characterized by their five-rayed symmetry and five ambulacra (pairs of tube feet). The Echinoidea includes the orders Echinidea, Echinochordata, Echinoidea, Echinoidea, and Echinidea. The orders Echinidea and Echinoidea are the most common and widespread groups within the Echinoidea, with representatives found in both the Paleozoic and Mesozoic eras. The order Echinidea includes the class Echinidea, which contains the sub-class Echinoidea, and the order Echinidea includes the class Echinidea, which contains the sub-class Echinidea.

The Echinoidea are known for their radial symmetry and their ability to regenerate lost body parts. The radial symmetry is evident in the five-rayed structure of their body, which is composed of a central disc and five arms. The arms are equipped with tube feet, which are used for locomotion and feeding. The Echinoidea also have a unique water vascular system, which allows them to move and filter water for food. The Echinoidea are found in a variety of marine environments, from shallow coastal areas to deep oceanic regions.
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bular surface of the star-fish with the ambu-

Fig. 15.—Oval of ambulacral grooves of Asterina rubens. a, pore for pedicel; b, the same magnified.

lateral ciliated epithelium. Studding the perisome are num-

opposed to one another by their inner opposed ends, and

Figs. 12—Section of ray of Asterseptum auriculatum.
a, vertebral ossicles; b, ambulacral ossicles; c, pedicels; d, marginal ossicles; e, pedicle (A. Gaudy).

and united by their lower or outer ends to rows of plates, the ambulacral ossicles, articulate to

Fig. 13.—Tegmental skeleton of Asteroidea rubens.

a, connecting pieces; b, membrane between plates. (After Gaudy.)

one another by their outer opposed ends, and united

Fig. 14.—Asterina rubens.
a, madreporic, b, the same magnified, c, anus.

(Octoblasts, Echinus) there are several interradially placed madreporic tubercles. The doubly involuted madre-

pores incised one on the distal and the other on the oral

The stomach in most star-fishes is produced into five sac-

cular prolongations (cardinal sacs), above these it con-

tracts, but again dilates to form the pyloric sac, which

open out in each ray into a pair of parallel diverticula having numerous caecal dilatations, and connected by a mesentery with the ambu-

lacer ossicles, which have a nervous external and muscular

surface of each ambulacral ossicle, and lying alternately

external and internal to one another in position on succes-

sive ossicles (fig. 15). The mouth, which is devoid of den-

tary apparatus, is situated in the middle of a membranous

disk in the centre of the oral surface. It leads by a short
gullet into the stomach. The stomach in most star-fishes is produced into five sac- 
cular prolongations (cardinal sacs), above these it con-
tracts, but again dilates to form the pyloric sac, which

give rise to five tubes, which open out in each ray into a

pair of parallel diverticula having numerous caecal dilata-
tions, and connected by a mesentery with the ambu-
lacral ossicles, which have a nervous external and muscular

Fig. 16—Antibulacral surface of Asterina rubens.
a, madreporic, b, the same magnified, c, anus.

The stomach in most star-fishes is produced into five sac- 
cular prolongations (cardinal sacs), above these it con-
tracts, but again dilates to form the pyloric sac, which

give rise to five tubes, which open out in each ray into a

pair of parallel diverticula having numerous caecal dilata-
tions, and connected by a mesentery with the ambu-
lacral ossicles, which have a nervous external and muscular

surface of each ambulacral ossicle, and lying alternately

each ray underlies a strong band of transverse fibres, by which it is separated from the

ambulacral canal above. At the extremity of the ray the nerve terminates in an eye and its tentacle. The eyes are

small processes of the ectoderm, having a convex surface or cornea containing a large number of simple, conical,

pigmented ocelli. In the peritoneal cavity and ambulacral vessels is a watery fluid containing corpuscles. Respiration
appears to be effected by means of water supplied

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The interior of the body is lined with the plates of the perisome. In Solaster water can enter the body cavity by the interbrachial creniform plates through which the genital ducts pass.

Among the Astereida several modes of development have been observed. In some species the larva appears at times to be formed of the rays. The species Petelella ciliata hatches its young in a special pouch on the dorsal surface. The larva leaves its egg by a tube, but subsequently assumes a pentagonal form, and the provisional mouth comes to be placed at one side of the body. Central mouth and stomach afterwards developed open into each other at the time that the young star leaves the maternal pouch. In other cases the breeding-chamber may be formed by the bringing together of the bases of the rays, and the uniliated embryo develops at its anterior end club-shaped tubercles, by which it can attach itself to the breeding-chamber or to substrata objects. Until these processes appear the breeding-chamber remains closed. In general, the larvae of the Astereida begin life as a lobed and ciliated pseudo-embryo, a common form of which is the Bythocystis. Another form, the Brachiosoma, is distinguished principally by three tuberculated processes at the anterior end of the body. The ambulacral vessels of the adult are developed in the pseudo-embryo from a portion of one of the diverticula of the stomach in which originate the postanal canal and the whole or great portion of the mesodermic structures.

The Astereida are classified by M. Edmond Perrier as follows—

**DIVISION I**—Pedicellata pedunculata; pedicella (except in Echinaster and Pedicellaster) quadrangularly ambulacral.

**Asteria.** Ex Asterias (Asterichonechus), Holaster, Calveasterias, Anasterias, Labridaster, Pedwellaster.

**DIVISION II**—Pedicellata sessiles; pedicella of the same form as the peduncle.

1. **Dorsal skeleton reticulate**

2. **Dorsal skeleton of longitudinal series of rounded or quadrangular ossicles, usually unincinated.**

3. **Skeleton, at least of lower surface, of incised ossicles; dorsal and ventral marginal plates very distinct.**

4. **Sk. ossicles imbricated; with spine on the free border, or rounded and completely covered with small spines.**

5. **Skeleton of exoskehd.**

6. **Dorsal investment supported by spines radiating from the prominent skeletal ossicle.**
   Pyasterias. Ex. Pyasteris.

7. **Arms long, straight, distinct from disk, with minute spines or dorsal series.**

Of the Astereida (fig. 17) — The Astereida are represented in the Lower Silurian series of strata by the genera Echinaster, Palaster (including Calveasterias), Sistaster, Tenuaster, and Ostracasterias, in the Upper Silurian by Ophioaster, Palaeaster, Palaeomus, Petaster, Palaima, Leptaster, and Solaster; in the Devonian by Acanasterias, Palaeaster, Asterias (also in Carboniferous), and Holaster, in the Carboniferous by Schwanaster and Cretasterias, by Quinaster in the Triss, by Tropaster in the Liass; and by Asteropeten with other still living genera in the Liass and Liasterias. The Cretaceous strata are more characterized species of the recent genera Asteroidea, Ophioasterias, Goniasterias, and Stellasterias.

**Order III.**—Ophiuridea. The brittle stars (fig 18) have a general external resemblance to the Asterida. The body consists of a central disk with five or more simple or less usually ramifying rays, which are sharply distinguished from the disk, and are without ambulacral grooves, and contain no prolongations of the stomach. Spaces and plates, also hooks (considered to be the representatives of the pedicellaria of the Astereida), are developed in the perisome. The dorsal skeleton of the arms is constituted usually of a ventral or supernambulacral row of plates, a dorsal median or antambulacral row, and two side rows of spinous imbricated plates. More rarely the perisome of the arm is leathery in consistence, and bears small plates, of which the ventral are the largest, and perforated with a double line of pores. The internal axial skeleton is formed by the vertebro-axial ossicles (fig. 15), the right and left halves of which are united by a longitudinal suture. The axial ossicles are articulated to one another by means of peg-and-socket joints. On the lower surface of each, corresponding to a depression on its dorsal surface, there is a groove for the passage of a radial ambulacral vessel and a nerve. The innermost of the axial ossicles is in two articulated halves, and the neighbouring halves of every two arms are connected with a couple of interambulacral pieces, with the inner edges of which is articulated a single ossicle, the torus angularis. The last-mentioned bears the papilla angularis, and beneath these the palpe angularis, which are short flat processes, moved by muscles, and serving as teeth (see fig. 20). Right and left of the origin of each arm; within the body disk, on the ventral side, is an elongated ossicle, which in the Parasteridae unites at the margin of the disk with an arched piece running towards the centre of the dorsal surface. The mouth is in the centre of the oral face, and at each of its angles is a pair of tentacles. It leads into a simple sac-like alimentary canal, which is without anus. The madreporic canal, the walls of which are strengthened with calcifications, leads from the surface of one of the interradially situated seta buccalia on the ventral side of the disk into a circular ambulacral canal, upon which rest minute plates, the homologues of the Holothurian calyces. Opening into the circular ambulacral canal, and corresponding in position to the madreporic canal, there

**Fig. 18.** — Ophiohols bells, upper surface.

**Fig. 19.** — Axial ossicle of Ophiohola. (After Müller.)

A. dorsal surface; B. ventral surface; C. ventral groove; D. facet for tentacle.
ECHINODERMATA are usually four interradially placed Polian vessels. The necks of the Polian vessels and the ambulacral ring give off the diverticula termed by Sunrock as ambulacrala ecm. From the ambulacral ring proceed the five radial canals between the superambulacral plates and the axial canals. In front of each oscule they give off right and left branches to the pedicles. These are tentacle-like, devoid of basal vessels, and, except in the Euryalidae, pass out through openings between the superambulacral and lateral plates. The nervous system consists of an oral ring, which supplies a branch to each arm, running superficial to its radial ambulacral canal. Between the nerve and the latter is a neural canal. The genital organs are pairs of racemose glands attached to the inner dorsal surface of the disk; their products are shed into the perivisceral cavity, whence they make their way through the genital canals between the origins of the arms.

Hemaphroditism has been observed in the species Ophiolepis symmetrical and in some genera, as Ophiocoma and Ophiohima, simultaneous reproduction occurs. According to Lutken, this at an early age is more especially exhibited by the ovi-ogons forms. In certain cases development takes place within the egg, without any free pseudoprotocelomic stage, but most generally metamorphosis from a plankton larva takes place. The bilaterally symmetrical skeleton of the plates consists of eight radially divergent calcareous rods. The development of the embryo commences with the production of two coelomic cavities, one on each side of the gill slit, which form cellular blastomere masses, one behind and the other in front of the stomach, and a third to the left of the pseudocoel. The ambulacral system of the adult is developed from the last of these, which unites with the mass in front of the stomach to form the ventral portion of the body, whilst the posterior mass furnishes the dorsal portion.

The Ophiuridae may be classified as follows:

Sub-order I.—OPHURIDE. Arms unbranched, ambulacral furrows covered with plates, genital clits ordinarvly fire, but creeping.

A. Oral cloths armed

(i) No papillae antimeres

OPHURIDAE. Bucca; stactes trigonal, disc granulated Ex Ophiura (Ophiocoma), Ophiocoma, Ophiopmna.

(ii) Bucca; stactes pentagonal, disc scales naked Ex Ophiolepis, Ophiocoma, Ophiura.

APPENDICIDE. Disc ragged and scaly, ray plates grannated Ex Ambiphora, Ophiocoma, Ophiocoma.

OPHIOLEIDAE. Bucca; stactes naked, ray cloths with soft integument Ex Ophiocoma, Ophiocoma.

(3) Papillae antimeres present

OPHIURIDE. Disc covered with solid plates Ex Ophiocoma, Ophiocoma, Ophiocoma.

Sub-order II.—EURYALIDE. Arms simple or ramified, and capable of being rolled up towards the mouth, ambulacral furrows covered by soft integument. Spines are not present, but there are tufts of papilla on the ventral surface of the arms, genital clits ten.

Annulidea, by Astrophyton, Troyaster, Asteroidea, Asteoridida, Asteoridida, Ophiocoma, Ophiocoma, and other genera.

Distribution in time of Ophiuridae.—The following Palaeozoic genera are commonly referred to the Ophiuridae.—Pre-Cambrian (Lower Silurian), Paleohoria, Aenura, and Exstrella. Devonian or the same (Upper Silurian), Auspaya (Devonian of New York) Ophiura occurs in the Carboniferous Limestone of Rockies. In the Mesozoic, the Astrophyton, by Astrophyton, Troyaster, Asteroidea, Asteoridida, and in higher Secondary strata Ophiocoma, Ophiocoma, Ophiocoma, and other genera.

The Ophiuridae and Asteridea possess, in a marked degree, the power exhibited by the whole of the Echinodermata of reproducing lost portions of the body. The former have received the name of the Brachioidea. On account of the remarkable facility with which species of the genus Ophiocoma are capable of laying away their arms entire, but, at will, rapidly break them into little pieces. The same property has been noticed in the genus Luides among the star-fishes, in the Crinoidea genus Comaster, and the Synaptidae among the Holothuridea. Writing of a species of Luides, Prof. E. Forbes remarks: “The first time I ever took one of these creatures I succeeded in getting it into the boat entire. Never having seen one before, and quite unconscious of its suicidal powers, I spread it out on a rowing bench, the better to admire its form and colours. On attempting to remove it for preservation, to my horror and disappointment, I found only an assemblage of rejected members. My conservative endeavours were all neutralized by its destructive exertions, and it is now badly represented in my cabinet by a dusky arm and an armless disk.” Major Fred H. Lang relates (Nature, Oct. 12, 1876), that during a dredging expedition in Torbay, presuming on the fact that as a rule he could take up the specimens of Comaster, Ophiocoma and Ophiocoma with his hands without occasioning their dismemberment, he “put about a hundred of the two sorts into a sponge-bag, but this was asking too much of them,” for on reaching home he found “that both Feather-stars and Bottle-stars had convulsed themselves into a mass of muce-meat! It would have been difficult to find a single portion of an arm or a quarter of an inch long.”

Order I.—ECHINODERMATA. The body in the Crinoidea is ciliated, shaped or burrow-form, and its base always in the young state and usually in the adult is attached by the apical pole either directly or, as more commonly, by means of a calcareous stem to submarine objects. The inferior or oral plate of the body or calyx is formed of polygonal plates articulated by their edges, and the superior or ventral plate or disk, which may be either flat or arched, is formed either by a personal membrane, occasionally strengthened with scattered calcifications, or, as in the Terebella, by regularly arranged plates, resembling those of the inferior wall. At the border of the calyx are 2-18, usually 5, arms or branches, which are movable, and can be closed together over the oral disk (fig 22). Between them, commonly in the centre of the disk, in the mouth, and near it, in one of the interradial spines, in the arms. It has been shown by Sir Wycliffe Thomson, (Phil. Transn vol. clv pt 2), that the skeleton of Asteridea and Echinidea may be divided into two systems of plates, the radial and the perisomatous. The former including all the surface of the stem, the conical plates, the radial plates, and the points of the arms and pinnules, and the latter the basals, oral, and anal plates, and the interradial and other plates or spines developed in the disk-membrane. The body of
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the pentaceroid is at first, while yet included within the pseudomere, and during its earliest fixed stage, surrounded and enclosed by plates of the pseudome system alone. The predominance of the pseudome system in the calyx of the older Crinoids and formally to them is hence a fact of considerable interest to the embryologist.

The stem is made up of numerous ossicles articulated and interpenetrated by elastic fibres and soft connective tissue. It is attached at its distal end by a root-like expansion, or by numerous, filamentous, branched cirri, having joints similar to those of the stem. Other and unbranched cirri are attached in whose to many of the ossicles of the stem. Through the centre of the stem runs a canal containing a soft solid substance. In the adult Antedon, as has been pointed out by Dr Carpenter (Proc. Roy. Soc., 1876), the medullary portion of the Crinoidal axis passes up through a pentagonal five-chambered dilatation of its cortical portion within the centro-dorsal plate, and reaching the cavity of the calyx, forms the pedicel by which chiefly the stem runs a canal into the axial canal by which chiefly the stem runs a canal into the axial canal by which chiefly the stem runs a canal into the axial canal by which chiefly the stem runs a canal into the axial canal by which chiefly the stem runs a canal into the axial canal. The pedicel enters the calyx and passes through out its entire length, more or less imbedded in its walls, to the commencement of the subtentacular canals, where it apparently becomes continuous with the generative piers of the disk. The stem varies in length, being short in Apecinus, long in Pentacrinus; it is round and sometimes moniform in most Palaeozoic Crinoids, but in Plageryrinus compressed as it nears the calyx; in Woodocrinus it tapers from the calyx downwards. In the Palaeozoic Crinoids the articulations of the ossicles radiate from the central canal, which is larger than in the more modern forms. In the Mesozoic genera the articular facets are commonly united by crescentic or stellate ridges. In the Silurian genus Perichocrinus the ossicles of the stem are alternately thicker and thinner. The calyx, which may be regarded as formed of the uppermost ossicles of the stem, is composed of several series of plates. The lowest of these is commonly formed by 2-6 pieces, the basalia, which in Rhassicrinus appear to be represented by a single central plate. The basalia in the Tesselata are succeeded by the parabasalia or sub-radialia; after the basalia or these come one or more rows of plates (in Rhassicrinus three), the radialia (see fig. 23). In Pentactinurus the radialia seem to form the commencement of the calyx. Supported by the radialia are series of arm plates, or brachidia, from the uppermost of which, as in Pentacrinus, may bifurcate the palamae. The ossicles of the arms are sometimes single, sometimes united by syngenes, or immovable sutures. In the Silurian genera Antocrinus and Cretacrinus the subdivisions of the arms are very numerous, and by their lateral articulation form web-like expansions.

The arms of Poteriocrinus phatius bifurcate 4 times, giving 80 rays; the total number of plates in that species has been estimated at 1300 (see J. G. Groomfett, Rep. Brit. Assoc. 1875, p. 65). In the calyx of the Tesselata there are plates, interradialia, present between the radialia. In Antedon the central portion of the viscera is contained in a basin formed by the 1st, 2d, and 3d radialia, and by the 1st and 2d pairs of brachidia, and the basal segments of the pinnules borne by the second, and the pinnules cavity is completed by the perissome uniting the basal segments of the arms. Where, as in the Articulata, represented by the modern Crinoids, the disk is more or less membranous, four or five deep furrows radiate upon its surface from the mouth, which pass on to the oral surface of the arms and extend to the extreme of their pinnules. They carry the hollow ambulacral tentacles, which pass out through pores in the perissome. In 1865 Mr J. Rofe demonstrated (Geol. Mag., 1845) in the case of several genera of Tesselata Crinoids from the Mountain Lime-stone (Actinocrinus, Amphoraecrinus, Cyathocrinus, and Plageryrinus) that the grooves on the upper surface of the arms divide at their base into two channels—(1) a superior channel passing up beneath (in some cases partly within) the plates of the dome or disk to its apex, and there uniting with an internal circular aperture, probably the mouth; and (2) an inferior channel which goes direct into the visceral cavity. These channels, since their discovery by Mr Rofe, have been shown to be generally present in the Tesselata Crinoids. The superior channels, on the supposition that the central opening is a mouth, doubtless served for the supply of food and of water for respiration; whilst the inferior channels probably gave passage to the motor muscles of the arms, and placed the visceral cavity in connection with the ovaries, if the latter, as in modern Crinoids, were situated in the arms. In the Palaeozoic genus Rhodocrinus the arm is cylindrical, and without a groove on the upper surface, but immediately below its base is situated the orifice of a passage which turns towards the arms. What in the Palaeozoic Crinoids is commonly regarded as the anal opening is situated at the extremity of a proboscisiform tube (fig. 24) inter-radially placed, and often of great length—as much as 4 inches in Poteriocrinus phatius. In existing Crinoids there are two apertures in the disk, the mouth, usually central, and in Rhocols, and the inter-radially situated anus. The mouth is closed by lobes of the perissome, the oral valves, which may contain calcareous plates. Between these run the oral or ambulacral grooves from the mouth to the arms. In Antedon (Comatula) the alimentary canal passes obliquely downwards from the mouth, then horizontally, and after more than a complete turn bends upwards again, and ends in a rectal chamber terminating in a spout-like prominence. Between the exterior of the mucus wall of the alimentary canal and its peritonal covering is the intramural space. The double wall of the canal is strengthened by calcareous disks; and it is by the folding of the inner side of the wall, and the resultant piling together of layers of these plates that the vertical columnella is produced. The body cavity is lined by a smooth peritonal membrane. The ambulacral furrows are bordered by plates, the ambulacral or marginal lamellae, as in Rhassocrinus and Pentacrinus, or, as in Antedon, by elevated ridges of the perissome, produced at the edge into a series of small lobes or valvules, and having grouped on their inner side the pedicels. The epithelial floor of the grooves, where there is good reason to believe, is lined with cells, which, like those of the gullet, serve to create currents in the water and thus to bring into the mouth Diatomaceae, spores of Algae, minute Entomostraca, and other nutritive matter.

In Antedon, as has been shown by Dr Carpenter...
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(fig 25), the tentacles communicate at their bases with a common trunk, the tentacular canal. Beneath this, but in communication with it, lies the subtentacular canal, which is usually divided by a more or less incomplete septum. Each of the subtentacular canals is continued with a branch of the axial canal, which communicates with the dorsal portion of the perivisceral cavity by means of a minute pore situated nearly at the centre of the lower surface of the visceral mass, and partly occupied by the pedicle before referred to. As the axial canal extends downward through the visceral mass it comes into contiguity with the alimentary canal, and opens into it by irregular passages. There is in the arms a third canal, the coelomic, which is a continuation of the body-cavity or coelom, and is separated from the subtentacular canal by a transverse partition. At the junction of this partition with the septum of the subtentacular canal there is a passage, the septal canal, in which lies the cellular cord known as the generative tract, in connection with the visceral genital tissue. Enlargements of the rachis in the pinnules constitute the genital glands of the Crinoids, the products of which may or may not be discharged by special slits. Towards the extremity of the pinnules there is a transition between the coelom and subtentacular canals thus away, and becomes finally obsolete, thus possibly affording a means for the circulation of the nutritive fluid of the body, the subtentacular canals constituting an arterial or distributive and the coelom a venous or collective system of vessels.

From the arms the tentacular canals proceed inwards to unite with a circular canal situated around the gutlet, and having connected with it numerous short processes similar to the axis ambulacralis crani of the Ophiuridae (see page 635). There is no madreporic tubule, and the axial or madreporic canal is apparently unrepresented in the Crinoids. Reproduction seems to be effected by the tentacles, and in Comatula also by the access of water through pores in the oral portions, communicating with a series of sinuses below its under surface by means of funnel-shaped canals. The central organ of the nervous system in Asteroidea, according to Carpenter's, is the thickened dorsal portion of the axis of the stem within the corono-dorsal plate, which supplies branches to the cirri and the arms, and corresponds probably with the axial sheath which, in Pentactaria, sends off cords at the nodes of the stem into the whorls of cirri (see fig 21). A filibril band underlying the epithelial floor of the bursal funnels is regarded by Ludwig as a nerve — an afferent rather than a motor nerve (Carpenter).

The development commences with the formation from the egg of an oral morula, which secretes four loop-like ciliated bands, and a posterior terminal tuft of cilia. An endodermal sac or endoderm results from an invagination of the blastoderm between the third and fourth circular bands, and from this three diverticula, two lateral and one ventral, like their rows, the remainder of the archenteron becoming an alimentary cavity communicating with an anterior ovisac. The lateral diverticula are transformed into pericentral sacs, one on the dorsal the other on the ventral side of the alimentary cavity, when the protuberance becomes a true axis in length, there are formed two circles, each of five calcareous plates, which eventually become the oral and basal osicles of the corym. From the centre of the posterior end extends a row of eight calcareous rings, the future stem of the Crinoid, surrounding a backward prolongation of the dorsal pericentral sac. At the posterior extremity of the row is a ctenostome disk, by which the young Crinoid subsequently attaches itself. The ambulacral or the pseudotentacular system and the two lower bands of cirri disappear, and afterwards the two upper bands, and the endothen becomes fixed to a stone, a seaweed, or some other object. A new mouth is formed in the centre of the disk by the separation of the oral plates, and the intestine by the production of a diverticulum of the alimentary cavity. In the early Pentactara and stage of Comatula the basal stem rests upon the corono-dorsal segment, but becomes at length metamorphosed into a single piece, the peduncle, and the corono-dorsal segment by degrees increasing in size, the first radials come to rest upon its enfolded lip. During the same period, after the formation of an anus, the oral and basal plates disappear. The development of the basal column takes place as the prolongation of the point of the column enlarges to form the corono-dorsal plate. At the end of five or six months, when about 1 inch in diameter, the young Comatula detaches itself from its stalk, and is then able to move by means of its arms. The Pentactaria shows its form of Comatula (fig 26), previous to its discovery of the ultimate stage of its growth, had been termed by Vaughan Thompson Pentactaria euripus. The Crinoids are classed as follows:

Order 1 WEDLELLIA Canal completely formed of calcareous plates, oral face with ambulacral funnels

Family 1 TELASCITIA, Ex Centactaria, Asteroidea

Order 2 ARTICULATA Canal face of calcareous usually membranous or sub-membranous, with ambulacral funnels

Family 1 PENTACTARIA Always attached, Ex Pentactaria, Asteroidea

Family 2 COMATULIDE Attached only in the young state. Ex Astea, Phaneroia. The Cretaceous genus Merciaea appears to have been unattached.

The Crinoids are represented by Gephyroidea, Heteroecyae, Mesozoic, Tholus, Echinoidea, Phyllophora, Pachyecia, Comitaria, Pseudocomitaria, Xylocepha, Cystoceras, Echinoceras, and numerous other genera in the Paleozoic strata, where their remains, especially in the Carboniferous series, are often the chief constituents of vast masses of compact limestone. From these form the innumerable petals of the stem have come to be known as corals, echinoderms, or echinodermata, and in the north of England, as 'St Cath.
Echinodermata

Let's heads" Among the various forms by which the Crinoids were represented during the Mesozoic period, to the close of which they diminished materially in number, are Eocrinus (Maschelkalk), Eocrinus, Pedicinaria (Lias); Comatulidea (Rhynochocrinus, Eocrinus, and cephalic and posterior plates with the body-cavity. (See Billings, Ann. and Mag. of Nat. Hist. 1870, p. 259-61.)

What is usually regarded as the mouth is situated in the centre of the ventral surface of the calyx, opposite the point of attachment of the stem, and from it radiates the furrows for the arms, whence the appendages are present. It is apparently small and circular in Spheronites; in Cystoideae it is transversely elongated and lobed; in Hemicyclus elevated on a peduncle; in Echinocysta usually longitudinal and bordered by peculiar plates. A small perforation alongside the mouth, considered to be the anus, is generally present. It has sometimes, as in Echinocysta (fig. 30) and Apioctenites, the form of "an

FIG. 28.-Echinocysta arnautus. (After Forbes.)

a, mouth; b, anal aperture, and c, ovarian pyramid of the same, enlarged.

Arched or crescentic groove terminating apparently at each end with a pore, and having united with it, or placed a little below it, an orifice in the middle line of a suture, as in the junction of two oral plates" (Forbes). Almost invariably, on the oral portion of the body, interradially placed, is a round or oval aperture covered by a pyramid of 5 or 6 triangular valves. This is the opinion of most authorities as probably the ovarial orifice; but according to Mr Billings it is an oro-anal aperture, the central opening or mouth above mentioned being an "ambulacral orifice." Cystidea first occur in strata of Cambrian age. They especially characterize the Lower and Upper Silurian series of rocks, and apparently died out in the Carboniferous epoch.

Order V.—Cystidea.—The body in the Cystidea is in most cases rounded, and is covered with polygonal plates; it is attached by a stem, and may be provided with arms or pinnules developed from the upper or oral surface. The stem is short, usually similar to that of the Crinoida in construction, but without cirri; the joints are rounded, and sometimes moniliform, and usually become broader but thinner towards the base of the body. In H. Woodward, Geol. Mag. 1871, p. 71) the calyx is compressed laterally, and shows sculpturing similar to that of the plates of the pedunculated Cystidea. The plates of the calyx are pentagonal, hexagonal, or imperfectly trigonal, and are closely united together, they vary in number (1 in fig. 22) are very numerous. In Cystoideus, the calyx is composed of three rows of plates, which may be regarded as basal, parabasal, and radial. According to Prof. E. Forbes (Mem. of the Geol. Sur. of Great Britain, 1845, vol. ii. part 2), the following series of plates may be generally distinguished:—a basal series; subovarian, centro-lateral, and supra-ovarian series on a plane below, on the same plane with, and on a plane above the ovarian pyramid respectively; subovarian plates or ossicles, encircling that structure; and oral plates, immediately surrounding the mouth, which vary considerably in number (fig. 22). The plates are frequently ornamented with grooves and tubercles. Arms and pinnules are not univalve. In Comarctoidea punctata, Billings, the arms are free, sometimes nearly so; they are wanting, and the pinnules are attached to the upper portion of the calyx. Commonly the arms resemble ambulacra, and are reflected towards the base of the calyx, and closely applied to its surface. Pores on the antambulacral surface may be absent (Cystoideus), irregularly scattered (Cystoideus), in pairs (Spheronites), or, as in Pseudocrinus (2 in fig. 28), Echinocysta, and echinocysta, and other genera, slit-like, and arranged to form "nematocysts," or "hydrospheres," the two halves of each rhomb being on separate plates.

Mommaeus arnautus there are thirty pectinated rhombs, consisting each of a number of parallel internal flat tubes communicating with each other at ends with pores opening internally. The rhombs in Prionocysta are not tubular as in Cystoideus, but are made up of numerous parallel inward folds of an exceedingly thin part of the test. Again in Prionocysta tenans radiata the whole surface bears rhombs, which, when unjured, have a complete though very thin calcareous covering, and communicate by a small pore at their base with the body-cavity. (See Billings, Ann. and Mag. of Nat. Hist. 1870, p. 259-61.)

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Order VI.—Edrioasterida.—Under this head are grouped such forms as Edrioaster, Agelacrinites, and Hemicystites. The shape is that of a rounded star-like or flattened echinus with a concave base. There is an ovarian pyramid, but stem and arms are wanting, and the ambulacra communicate by perforations with the calyx cavity. The Edrioasterida are exclusively Palaeozoic. Their nearest living ally is the Australian genus Hyophycus Sars, Lov., which approaches Agelacrinites in form.

Order VII.—Blastoidea.—In this group of fossil Echinoidea the bud-shaped or ovastra, arumless, and closely plated calyx is supported on a short, jointed stem. Of the three basal plates in Pentremites two are double, succeeding the basal as a row of five pieces, and into the deep cloths of the upper portion of these fit the lower ends or spaces of the ambulacra; a third series of five small, deltoid, interradial plates occupy the spaces between the oral portions of the ambulacra. The ambulacra, or "pseudambulacral areas," present a superior surface formed by a double series of ossicles running from a median line to the border, where they support pinnules; beneath the ossicles is usually a lanceolate plate formed in many if not all species of Pentremites of two contiguous plates, and edged by a single row of transverse pieces, which are pierced with marginal pores.

Each row of pores opens below into one or more flat canals, or, according to the definition of Billings (Ann. and Mag. of Nat. Hist., vol. v. 4th ser. p. 263), into a "hydrosphere" consisting of "an elongated internal sac, one side of which is attached to the inside of the shell for
test], while the side opposite, or towards the central axis of the visceral cavity, is more or less deeply folded longitudinally (see fig 32). These internal canals, as suggested by Rojo, may possibly represent the tubes under the domes of the Cnidaria. In Caloaster the ambulacra are confined to the upper portion only of the calyx. Pores and attached tubes are wanting, but there are straitened structures between the arms, similar in appearance and probably also in function to the pectinated rhombs of the Cystidea, their ridges, as first shown by Rojo (God. Mag., 1965, ii. p 231), being the tops of a series of folds of a thin test or membrane, which were perhaps "respiration sacs", lined with cilia, and constructed of a porous test, through which air from the water could pass by diffusion.

The expanded ends of the neighbouring tubes of each two ambulacra form at the summit of the test four double and two single apertures commonly termed "ovarian orifices." Between the two latter there is usually a third, apparently anal, opening. In Echylona there are three paired, and two single pores only. The Blastodones, which are (i) represented by Pentanemes in Upper Silurian strata, attained their principal development during the Carboniferous epoch, at the close of which they seem to have become extinct.

Order VIII—Holothuridea.—The Holothuridea, Sea-cucumbers, Trepsangy, or Sea-cucumbers (figs. 33 and 34) have a long, cylindrical, sometimes flattened body, which is without shell and is brown to purple-red in colour. The persons, which is unciliated, is composed of three layers,—a structureless epidermis, a cellular dermis, and an internal elastic layer. The two interior layers contain calcareous spicules, which vary much according to the species, and may take the shape of perforated disks, wheels, anchors, and hooks (fig 35). Rarely the dorsal integument may develop an armature of overlapping plates (Pedina), which may bear spines (Echinoecusus). Underlying the persons is a layer of circular muscular fibres, some of which pass into the mesenteries, a second internal set of five simple or paired bands of longitudinal muscular fibres are attached at one end to the radial pieces of the calcareous oral ring, and supply branches to the oral tentacles, and at the other are inverted into the esophagus of the anus. It is by means of the longitudinal muscles that the Holothuridae, when irritated, effects the discharge of its viscera at the hinder extremity of its body. In the midst of a circle of tentacles, five or multiples of five in number, is the mouth, which is without dental apparatus. The tentacles vary considerably in shape, and may be cylindrical, shield-shaped, conoidal, or ramified. They serve as organs of touch, of nutrition, and occasionally also of locomotion. The alimentary canal is simple, and usually longer than the body, so as to be two or three times folded on itself, it is attached to the interior surface of the body by mesenteries, and may terminate in a cloaca. Its walls are composed of an external layer of circular, and an internal layer of longitudinal muscular fibres, and an innermost cellular lining. In common with the peritoneal surface of the body, it is ciliated. Two, or more rarely four or five, branched processes of the cloaca, the respiratory tree or water-lung, are ordinarily present, and are connected to the body-wall by a mesentery or by threads (fig 36). They appear to be exertory in function, water being continually passed into and out of them through the contractile cloaca. Their ultimate ramifications terminate in minute openings, by means of which they appear to have communication with the peritoneal cavity. In Echinoecusus the respiratory tree are only single-branched. In Synapta, in which they do not occur, there are funnel-shaped ciliated bodies attached to the mesentery of the alimentary canal. The respiratory tree occupying the ventral left interradial space has been observed in many cases to be surrounded by a plexus of the pseudohemal system of vessels. What are termed Ciliarian organs, which are appendages of the cloaca, which, according to Semper (Reisen im Archiv der Philippinen, 1 pp 139, 140), are muscular, and can be used as a means of defence, being capable of protrusion externally. The main trunks of the pseudohemal system, which is often exceedingly complex, are two vessels, one on the dorsal, the other on the ventral face of the intestine, which are connected with each other by capillary reticulations. The calcareous ring surrounding the gut, already referred to,
ECHO, in Greek mythology, one of the Oreads or mountain nymphs. The word denotes mere sound; and the told stories of her are so tantalizing that they can scarcely be said to belong to the class of fully-developed myths. As Seene to the Greek was clearly an object of the speaker...
her by Hera, whom the nymph by her chatter had prevented from discovering the sports of Zeus among her sister Oreades. Another tale relates that Echo fell in love with Narcissus, who was deaf to her entreaties, and that in her grief she wasted away until nothing remained but her bones and her voice. The name Narcissus, again, denotes one who is oppressed by lethargy, and thus the story becomes a counterpart to that of Selene and Endymion. Another legend speaks of her as being loved by Pan, the Latin Favonius, the soft and purifying breeze, and represents her lover as seeking in vain to see her form, although everywhere he hears her voice—Ovid, Met. xi. 356 et seq.; Paul. ix. 31, 6.

For Echo, in physics, see Acoustics, vol. i. p. 107.

Ecki, a city of Spain, in the province of Seville, 53 miles E.N.E. of the city of that name, on the left bank of the Jenu, Xeniil, or Genil, the ancient Singulis, a tributary of the Guadalquivir. The river, thus far navigable, is 18 miles.

The principal square is surrounded with pillared porticoes, and has a fountain in the centre; and along the river bank there runs a fine promenade, planted with poplar trees and adorned with statues. From an early period the shoemakers of Ecija have been in high repute throughout Spain; and woollen cloth, flannel, linen, and silks are manufactured in the town. The vintners are a most noted hostess. Among other remarkable institutions the most remarkable is Luis Valdes de Guerriar, the dramatist. Populat. 27,216.

ECK, JOHANN MAIER VON (1486-1543), the most indefatigable and important opponent of Martin Luther, was born 15th November 1486, at Eck in Swabia. His father was a peasant, who building a mill of the village, added Eck to the family name Maier. The son entered in his eleventh year the university of Heidelberg, from which he returned to Cologne, and afterwards to Freiburg, where, besides studying jurisprudence and mathematics, he taught philosophy. In 1506 he published a work on logic. From this time he appears to have devoted his attention chiefly to theology, and his skill and versatility in scholastic disputations having attracted considerable notice, the duke of Bavaria, in 1510, presented him to the chair of theology in the university of Ingolstadt. In 1515 he took part in a public disputatio at Bologna, and in 1516 in one at Vienna, on both occasions gaining great admiration. In 1518 he circulated privately his Octaves against Luther's thesis on the mass. Luther intrusted his defence to Carlstadt, who, besides answering the main questions of Eck in 400 distinct theses, declared his readiness to meet him in a public disputation. The challenge was accepted, and the disputation took place at Leipzig in the following year. It lasted for three weeks, and Luther as well as Carlstadt opposed himself to Eck. The general impression was that victory rested with Eck; but apparently success only embittered his animosity against his opponents, for from that time his whole efforts were devoted to Luther's overthrow. He induced the universities of Cologne and Louvain to condemn the Reformer's writings, and in 1520 went to Rome to obtain strict regulations against what he called the "Lutherans." He returned with the celebrated papal bull against Luther's writings, and with the commission to publish it, but at Leipsic met with so bad a reception from the inhabitants, that he was compelled to take refuge in the Pauline convent. Eck took a leading part in the Augsburg diet of 1530, and in the conferences at Worms in 1540 and at Ratisbon in 1541. He died in 1543. He is said to have been a bad linguist, and not an able theologian, but to have possessed great readiness and facility, a retentive memory, and remarkable dexterity in sophistical argumentation. Among his numerous writings is a translation of the Bible, which was written to supersede that of Luther, but met with no success.

ECKERMANN, JOHN PETER (1732-1854), friend of Goethe, and editor of his works, was born at Wunsin in Hanover, in 1792. After serving as a volunteer in the War of Liberation (1813-1814), he obtained an appointment in the war office at Hanover. At the age of twenty-five he became a student at the gymnasium of Hanover, and afterwards at the university of Gottingen, returning to Hanover in 1825. His acquaintance with Goethe began in the following year, when he sent to him the manuscript of his "Beitrage zur Poese." Soon afterwards he went to Weimar, and was appointed private secretary to the poet. For several years he was also engaged as tutor to the son of the grand duke. In 1820 he travelled in Italy with Goethe's son. In 1838 he was named councillor of the grand duchy, and appointed librarian to the grand duchess. Eckermann is chiefly remembered for the important contributions to our knowledge of the great poet contained in his Gespräche mit Goethe, the first and second parts of which appeared in 1836, and the third in 1848. This work was first translated into English by Margaret Fuller, and published at Boston, U.S., in 1859. Another English translation, by John Ozenford, appeared in London in 1860. It has been translated into almost all the European languages, excepting Turkish. To Eckermann Goethe intrusted the publication of his posthumous works (1832-1833). He was also joint-editor with Riemer of the complete edition of Goethe's works in 40 vols. (1839-1840). Eckermann died at Weimar, December 3, 1854.

ECKERSBERG, CARL VILHELM (1783-1853), Danish painter, was born in South Jutland in 1783. He became successively the pupil of Abildgaard and of Davids. From 1810 to 1813 he lived at Paris under the direction of the latter, and then proceeded, as an independent artist, to Rome, where he worked until 1816 in close fellowship with Thorwaldsen. His paintings from this period—the Spartan Boy, Bacchus and Ariadne, and Ulysses—testify to the influence of the great sculptor over the art of Eckersberg. Returninng to Copenhagen, he found himself easily able to take the first place among the Danish painters of his time, and his portraits especially were in extreme popularity. It is claimed for Eckersberg by the native critics that "he created a Danish colour," that is to say, he was the first painter to throw off conventional tones and the pseudo-classical landscape, in exchange for the clear atmosphere and natural outlines of Danish scenery. But Denmark has no heroic landscape, and Eckersberg in losing the golden common-places scarcely succeeds in being delightful. His landscapes, however, are pure and true, while his figure-pieces he is almost as well as Carlstadt opposed himself to Eck. The general
ECKHART, JOHANNES, or, according to the general designation, Meister Eckhart, the first of the great speculative mystics, flourished during the latter part of the 13th and the early part of the 14th. Extremely little is known of his life; the date and place of his birth are equally uncertain. According to some accounts, he was a native of Strasburg, a town which he was afterwards closely connected; according to others, he was born in Saxony. Trithemius, one of the best authorities, speaks of him merely as "Thietomacus." 1260 has frequently been given as the date of his birth; it was in all probability some years earlier, for we know that he was advanced in age at the time of his death, about 1327. He appears to have entered the Dominican order, and to have acted for some time as professor at one of the colleges in Paris. His reputation for learning was very high, and in 1302 he was summoned to Rome by Boniface VIII., to assist in the controversy then being carried on with Philip of France. From Boniface he received the degree of doctor. In 1304 he became provincial of his order for Saxony, and in 1307 was vicar-general for Bohemia. In both provinces he was distinguished for his practical reforms and for his power in preaching. In what manner he ceased to hold his high office we do not know; indeed, several years of his life about this time are a complete blank. Towards 1325 we hear of him as preaching with great effect at Cologne, where he gathered round him a numerous band of followers. Before this time, and in all probability at Strasburg, where he appears to have been for some years, he had come in contact with the Beghards (q. v.) and Brethren of the Free Spirit, whose fundamental notions he may indeed be said to have systematized and expounded in the highest form to which they could attain. In 1327 the opponents of the Beghards laid hold of certain propositions contained in Eckhart's works, and he was summoned before the Inquisition at Cologne. The history of this accusation is by no means clear. Eckhart appears, however, to have been enrolled as a conditional recantation—that is, he professed to disavow whatever in his writings could be shown to be erroneous. Further appeal, perhaps at his own request, was made to the Pope, and in 1329 a bill was published condemning certain propositions extracted from Eckhart's works. But before its publication Eckhart was dead. The exact date of his death is unknown. Of his writings several of which are enumerated by Trithemius, there remain only the Sermons and a few tractates. Till recently the majority of these were attributed to Tauler, and it is only from Pfeiffer's careful edition (Deutsche Mystiker d. XVI. Jahrhunderts, vol. ii., 1857) that one has been able to gather a true idea of Eckhart's activity. From his works it is evident that he was deeply learned in all the philosophy of the time. He was a thorough Aristotelian, but by preference appears to have been drawn towards the mystical writings of the neo-Platonists and the pseudo-Dionysius. His style is unsystematic, brief, and abounding in symbolical expression. His manner of thinking is clear, calm, and logical, and he has certainly given the most complete exposition of what may be called Christian pantheism.

Eckhart has been called the first of the speculative mystics; but such a designation requires some qualification. Within the Christian church from the time of Erigena there had been a constant stream of what must be called mysticism, originating for the most part from the writings of the neo-Platonists and of Dionysius the Areopagite. This tendency may be noted in Bonaventura, in Albert (under whom Eckhart is said to have studied), and in Aquinas; it is more prominent in Hugo and Richard of St Victor, though with them it took a practical rather than a speculative direction. But in all these writers, with the partial exception of Erigena, who occupies a quite peculiar position, the mystical element was in strict subordination to some other element which might be called symbolical, but were not thereby explained or rationalized. In Eckhart's writings and preaching, on the other hand, the element of mystical speculation for the first time comes to the front as all-important. By its means the church doctrines are made intelligible to the many, and from it their true significance is derived; it is natural that he should gradually diverge more and more widely from the traditional doctrine, so that at length the relation between his teaching and that of the church appeared to be one of opposition rather than of reconciliation. Eckhart is thus in truth the first who attempted with perfect freedom and logical consistency to give a speculative basis to religious doctrines.

It is not possible to expound in detail how Eckhart endeavours to explain the main principles of the Christian faith, but it is necessary to note the two most important points in his as in all mystical theories. First, his doctrine of the divine nature, and second, his explanation of the relation between God and human thought. The two are logically connected, and a complete exposition of his theory might start from either his theology or his psychology. Lasson, the author of a most valuable monograph on Eckhart, adopts the latter course, but for many reasons the other appears the most systematic.

The fundamental thought from which Eckhart's theology starts is that of the Absolute or Abstract Unity as the only real existence. Apart from God no thing has real being. But this Absolute is, for Eckhart, the Deus absconditus, the 5Sar Eyneousc of the neo-Platonic theology. With Dionysius the Areopagite, Eckhart describes this divine essence, the Godhead, as absolutely without predicates, all determinations are limitations which destroy its infinite being. The Godhead is incomprehensible, inexpresable. It is in truth nothing; yet as the most real of beings it must be conceived as absolutely potential, as containing in itself the origin and final end of all things. This Godhead is not God as known to us. From the Godhead the triune God proceeds or is evolved. At this point, at this transition between the divine Absolute and the personal deity, Eckhart is face to face with the crucial difficulty of all speculative mysticism, and it is of interest to compare his method of solution with that adopted by later thinkers of like tendencies, e.g., Boehme and Basler. In the Godhead, as in everything, according to Eckhart, there must be distinguished matter and form, or, as they are more usually called, essence and nature. The potentiality, what the thing is in itself; the form or nature is that which it becomes as an object for others. The Godhead reveals itself in the personal God, the Father, as the spiritual substance, and as such can only become real by consciousness, by reflection on self, by self-expression. That which reflects is the Son in the Father. The Father is the power through and in which the Father becomes self-conscious. As there is here no distinction of time or space, Father and Son are in very truth one. The Father eternally begets the Son, and the return of the Son into the Father in love and mutual will is the Spirit. The Father is not before the Son; only through the begetting of the Son, only through arriving at self-consciousness, does he become the Father.

The genesis of the Son from the Father involves also, according to Eckhart, the production of the world of things. For God is reason, and in reason is contained the ideal world, the world of creatures, not in time and space, which becomes materialized. In materialization all things are made, but not in time and space, and it is in time and space that it takes form and form, in ideal form. He holds strongly to the so-called Platonic view that, over and above sensible things, there exists a realm of ideal forms or exemplars, to be apprehended by pure thought, through thought freed from the limitations of space and time. How this ideal world is related to the world of real things he does not show, nor does he explain the apparent independence of the material universe. When, therefore, Eckhart speaks of the world as necessary to the divine existence, of God as loving Himself in created things, and of all things being integrated into the infinite universe, he is understood to speak of an ideal world, not of things as known to us.

As all things have arisen from God, so all things desire to return into the unity of the divine. In the Son, the power of the ineffable cognition, the power of creating and being created, is to be found, and in the Son is the power of returning to the Father. In man, the noblest of created things, this return is brought about. In man, specially, there is the faculty of supersensible cogitation, the power of comprehending the ground of both God and of the universe. This peculiar power, called
by Eckhart the spark (Punkleus, Scintilla), is in truth God working in man. In cognition of God, God and man are one; there is no distinction of knower and known, and hence, as opposed to empirical knowledge, it is called faith. In each case, there is an internal, not only an external, reason, but will, for the divine illumination becomes operative or takes real effect through the will.

To attain to full union with God is the final end of activity, and the means, it is clear, must be the renunciation of all individuality. And hence it appears to be the only method whereby the birth of the Son in the soul may be brought about. When this state has been reached, then the human soul is one with God; its will is God's; no evil can be wrought by it, it cannot sin. The practical consequences which would follow from such a doctrine, and which did appear among the Brethren of the Free Spirit, were evaded, rather than overcome, by Eckhart. For, according to his teaching, all the above applies only to the "spark" in the soul; the other faculties may be reasonably and legitimately employed about other and temporal matters. By this grade, also, he escapes the doctrines that works are entirely insufficient. He is careful to hold the balance between inward feeling and outward action, and on this point his teaching is important in relation to the later Reformation thinkers.

On the specifically theological doctrines of Eckhart, such as Grace, Incarnation, the Fall, Redemption and Sin, it is not possible to enter in brief compass. A most adequate account of them will be found in lapidary paragraphs elsewhere referred to.

The most important of the many works upon Eckhart are: Piëler, Deutche Eckhel, vol. ii. (Hamburg, 1833); Eckhel, Deutscher Vierteljahresschrift, 1864; Johanns, Revisser der Deutschen Philologie, 1736; Gluck, Geschichte d. Deutschen Mystik, 1737

ECKHEL, JOSEPH HILARIUS (1737-1798), one of the most distinguished numismatists, was born at Enzersfeld in Lower Austria, January 13, 1737. His father was farm-steward to Count Zinzendorf, and he received his early education at the Jesuit's College, Vienna. Here at the age of fourteen he was admitted into the order, still pursuing his studies with earnestness, and especially devoting himself to antiquities and numismatics. After being engaged as professor of poetry and rhetoric, first at Steyer and afterwards at Vienna, he was appointed in 1772 keeper of the cabinet of coins at the Jesuit's College, and in the same year he went to Italy for the purpose of personal inspection and study of antiquities and coins. At Florence he was employed to arrange the collection of the grand duke of Tuscany; and the first fruits of his study of this and other collections appeared in his Numeri Vetera Aedificati, published in 1775. On the dissolution of the order of Jesuits in 1773, Eckhel was appointed by the empress Maria Theresa professor of antiquities and numismatics at the university of Vienna, and this post he held for twenty-four years. He was in the following year made keeper of the imperial cabinet of coins, and in 1779 appeared his Catalogus Viadobonensis Numorum Veteran. Eckhel's great work is the Numeris Veterum, in 8 vol. in folio, which was published in 1792, and the last in 1798. The author's rich learning, comprehensive grasp of his subject, admirable order and precision of statement in this master-piece draw from Heyne enthusiastic praise, and the acknowledgment that Eckhel, as the Cyprius of numismatists, had, out of the mass of previously loose and confused facts, constituted a true science. A volume of Adhenda, prepared by Steinbuchel from Eckhel's papers after his death, was published in 1826. Among the other works of this great scolar are: Chaus de Piéregrave du Cabinet Imperial de France, a useful school-book, a work entitled Kurzezüge Anfangsgrunde von alien Numismatik (1787), of which a French version enlarged by Jacob appeared in 1825, &c. Eckhel died at Vienna, May 16, 1798.

ECCLECTIC (from ἐκλάω, to select), a term of which the meaning is in philosophy, denotes a thinker whose views are borrowed partly from one, partly from another, of his predecessors. It perhaps requires to be noted that, where the characteristic doctrines of a philosophy are not thus merely adopted, but are the modified products of a blending of the systems from which it takes its rise, the philosophy is not properly eclectic.

The history both of ancient and of modern eclecticism shows that eclecticism naturally springs up when, while pure literary culture makes the doctrines of the chief philosophers familiar and preserves an interest in philosophy, the first pursuit of thinkers is not purely speculative truth.

In the 2d century a. d., a remarkable tendency toward eclecticism began to manifest itself. The longing to arrive at the one explanation of all things which had inspired the older philosophers became less earnest, the belief, indeed, that any such explanation was attainable began to fail, and thus men, not feeling the need of one complete logical system, came to adopt from all systems the doctrines which best pleased them. In Panaitius we find one of the earliest examples of the modification of Stoicism by the eclectic spirit; and about the same time the same spirit displayed itself among the Peripatetics.

The philosophy that took root in Rome, where philosophy never became other than a secondary pursuit, was naturally for the most part eclectic; of this Cicero is the most striking illustration,—his philosophical works consisting of a mixture, with little or no blending, of doctrines borrowed from Stoicism, Peripatetics, and the scepticism of the Middle Academy. And, not to mention numerous names of minor importance, eclecticism had another representative at Rome in the school of Sextus and Sotion, who were half Stoic, half Pythagorean.

In the last stage of Greek philosophy the eclectic spirit produced remarkable results outside the philosophies of those properly called eclectics. Thinkers chose their doctrines from many sources,—from the venerated teaching of Aristotle and Plato, from that of the Pythagoreans and of the Stoics, from the old Greek mythology, and from the Jewish and other Oriental systems. Yet, it must be observed that neo-Platonism, Gnosticism, and the other systems which are grouped under the name Alexandrian, were not truly eclectic, consisting, as they did, not of a mere syncretism of Greek and Oriental thought, but of a mutual modification of the two. It is true that several of the neo-Platonists professed to accept all the teaching both of Plato and of Aristotle, but, in fact, they arbitrarily interpreted Aristotle so as to make him agree with Plato, and Plato so as to make his teachings consistent with the Christian systems which they had adopted, and the same manner as the schools attempted to reconcile Aristotle with the doctrines of the church. Among the early Christians, Clement of Alexandria, Origen, and Simeon were eclectics in philosophy.

The eclecticism of modern philosophy are too numerous to name. Of Italian philosophers the eclectics form a large proportion. Among the German may mention (though details cannot here be given) Wolff and his followers, as well as Mendelssohn, Eberhard, Plumer, and to some extent Schelling, whom, however, it would be incorrect to describe as merely an eclectic. In the first place he cannot be denied the praise of originality; and, in the second place, it is not so much that his views of any time were borrowed from a number of philosophers, as that his thinking was influenced first by one philosopher then another.

But, during the present century, the term eclectic has come to be specially applied to a number of French philosophers who differ considerably from one another. Of these the earliest was Royer-Collard, who was mainly a follower of Reid, and Mauro de Bure; but the name is still more appropriately given to the school of which the most distinguished members are Victor Cousin, Théodore Joubert, Daurac, St Hilaire, Esmant, Garner, and Ravaisson. Cousin, whose views varied considerably at different periods of his life, not only adopted freely what pleased him in the doctrines of Leibnitz, Royer-Collard, and Mauro de Bure, of Kant, Schelling, and Hegel, and of
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the ancient philosophies, but expressly maintained that the
eclectic is the only method now open to the philosophic,
whose function it is to observe into a critical selection and
nothing more. "Each system," he asserted, "is not false,
but incomplete, and in uniting all incomplete systems, we
should have a complete philosophy, adequate to the
totality of consciousness." But this assumes that every
philosophical truth is contained somewhere in the various
philosophies; and if this were surely rash to deny, there
is no doubt that philosophical truth undiscovered, but dis-
covered by human intelligence, it is evident that eclecti-
cism is not yet the only philosophy. For a discussion of
the question how far the above dicta of Cousin represent
his own method of philosophizing we must refer the reader
to the article Cousin. Eclecticism gained popularity,
and, partly owing to Cousin's position as minister of public
instruction, became the authorized system in the chief seats
of learning in France, where it has given a most remark-
able impulse to the study of the history of philosophy.

ECLIPSE. See ASTRONOMY.

ECSTASY (ἐκστασις, from ἐκστασθω, to put out of
its place, to alter), a term applied to a morbid mental condition,
in which the mind is entirely absorbed in the contemplation
of one dominant idea or object, and loses for the time its
normal self-control. With this there is commonly associ-
ated the prevalence of some strong emotion, which manifests
itself in various ways, and with varying degrees of intensity.
This state resembles in many points that of catalepsy
already described, but differs from it sufficiently to consti-
tute it a separate affection. The patient in ecstacy may lie
in a fixed position like the cataleptic, apparently quite un-
conscious, yet, on awaking, there is a distinct recollection
of visions perceived during this period. More frequently
there is violent emotional excitement, which may find ex-
pression in impassioned utterances, and in extravagant
bodily movements and gesticulations. This disease
usually presents itself as a kind of temporary religious in-
sanity, and has frequently appeared as an epidemic. It is
well illustrated in the celebrated examples of the dancing
epidemics of Germany and Italy in the Middle Ages, and
the Conulsioniawres of St Medieval at the grave of the Abbé
Paras in the early part of the last century, and in more re-
cent times has been witnessed during periods of religious
excitement in this country. This disorder is highly
tortuous, and readily spreads by imitation. As a disease
it is more curious than important, and for its treatment
requires the judicious exercise of moral influences rather
than medical remedies, although these also, as in the case
of similar ailments, may often be used with advantage.

ECUADOR, or, in full, LA REPUBLICA DEL ECUADOR, an
independent state of South America, traversed by the
equator, from which it takes its name, and bounded on the
N. by the United States of Colombia, E. by Brazil, S. by
Peru, and W. by the Pacific Ocean (see plate xi. vol.
1.). Its area cannot be stated with any close approxima-
tion to accuracy, for large districts along the frontiers are
equally claimed by Ecuador and the neighbouring powers;
and even within the limits of undisputed possession no
systematic survey has been undertaken. According to
Villavicencio, the area is only 127,205 Spanish square miles;
but P. Hanemann, quoted by Behm and Wagner (Bevolk-
erung der Erde, 1874, p. 76), makes it 248,330 by plani-
metric calculation on the basis of H. Kiepert's map in his
Handlungs, 1872, Kiepert places the eastern limit at 70°
W. of Greenwich, but does not assign to Ecuador the dis-
puted territory along both sides of the Marañon. The
population was stated by Villavicencio at 1,108,862 in 1857,
exclusive of about 200,000 wild "Indians," but an official
estimate for the same year is quoted by Wappaus, which gives
only 881,943, exclusive of 150,000 "wild" Indians, and
even this he thinks is probably too high. His opinion is
so far confirmed by the memoir of the minister Leon, published
in 1874 and 1875, according to which the total population, exclusive of about 200,000 Indians, was 866,137. The
Galapagos Islands, an unhabited group with an area of
2551 square miles, are dependent on Ecuador.

Mountains.—The great South American chain of the
Andes traverses Ecuador from south to north, and forms the
predominant factor in its physical constitution. Its twO
Cordilleras run parallel with each other, and incline an
elevated longitudinal valley about 40 miles wide and 300
miles long, which is divided by the transverse ridges, or
nudos, of Tipulpo and Ayausa into the three great basins
of Quito, Ambato, and Cuenca, which are again subdivided
by inferior ridges into irregular sections. The eastern
Cordilleras attain in several of its summits a height of
more than 18,000 feet; the western has only one (Chim-
borazo) which exceeds 17,500. The Quito plain lies 9500
feet above the sea, Ambato 5500, and Cuenca 7800: the
last two are comparatively narrow and melancholy, while
the first, though so much the loftiest of the three, is clothed
with luxuriant vegetation. The altitude of the Tipulpo or
Chinacche ridge, stretching across from Cotopaxi to Huiiza,
is 11,500, and that of the Ayausa ridge about 13,500.
Both the western and eastern slopes of the chain are marked
by magnificent valleys of erosion; the former, which con-
tains at least six successive terraces, has an average gradient
of 275 feet per mile, while that of the latter is only 125.
Granitic, gneissoid, and schistose rocks are the main
materials of the gigantic pile; the summits are capped
with trachyte and porphyry, and the sides are strewn with
dense beds of grava and volcanic debris. Thus, in the
whole Andean system do the individual mountains attain
so magnificent a development as in the Ecuadorian
section. Around the valley of Quito alone there are twenty
noble volcanic summits, presenting a beautiful variety of
form,—here a perfect and there a truncated cone, there
a jagged and blasted crest, and there again a smooth and
snow-covered dome.

In the Eastern Cordilleras the following are capped with perpetual
snow—Cayamb, Antisana, Cotopaxi, Llanganati, Sincolagou,
Sungu, Sana-turco, Tunguragua, Colinas, and Ayaus: in the
region between Chimborazo, Illiniza, the Galapagous group,
Corazon, Atacazo, Chiles, Caraburua, Yana-turco, and Quitunda.
Imbabura may either be assigned to the eastern range, or, perhaps,
more properly regarded as the common point of the two
mountains. At the northern end of the great central valley, attains
a height of 19,029 feet, and is remarkable for its vast eruptions of mud
and water, the most extensive of which took place in 1861. This
name, equivalent to the "fish-producing," from sima, fish, and bura,
mother, is supposed to refer to the quantities of Pseudodides cyclopium
said to have been contained in its discharges—a phenomenon, how-
ever, which has been called in question by Wagner, after a search-
ing investigation into the origin of the report. Cayamb (or by
mistake, Cayambo) is situated exactly on the equator, and is thus
distinguished, as Humboldt observes, from every other snow-capped
mountain in the world. It is the loftiest summit in the eastern
Cordilleras, and spreads out at the base over a very extensive area.
Antisana rises with a double dome to the height of 18,880 feet,
and presents the proof of its former activity in its magnificent
terraces, of which one, according to Wagner, is 180 feet
long, and five hundred feet deep. It may now be clasmed with the
apogean, though Humboldt saw smoke issuing in 1802. On the
side of the famous tomas of Antisana at a height of 13,300 feet
above the sea. To the next two peaks—Sincolagou and Rumi-
huay, respectively 16,360 and 16,083 feet in height—comparatively
little attention has been paid, perhaps from the rivalry of their
southern neighbour Cotopaxi. This magnificent mountain has
already been briefly described (vol. vi. p. 460). It is the loftiest
volcano in the world. The apogean is 29°, according to Wagner 29°, the north-western side being very
slightly steeper than the south-eastern. The spacial angle is
12° 20'. On the east it is covered with snow, but it is usually kept bare by the action of the trade winds. Its crater,
estimated by Wagner as less than that of Mount Etna, is bordered
and banded of trachytic rock, forming a huge caldera, white.
On the southern slope, at a height of 15,059 feet, a small
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cene of periphyttne andlits, called el Panche, the beak, or Clubes del Inca, the Inca's head, lefts its bare cliffs for above a thousand feet, and from its general appearance gives some show of reason to suppose that it is still much regarded as the most perfect summit of the mountain blown off at the first eruption in 1522. The present summit is a cone-shaped cloud, and even in the cleanest mouth of the year it becomes invisible only for eight or ten days. "The Taucunga plateaus," says Wagner (Neu Reisen im trop. Amerika, p. 514), "the height of 30,000 feet is the prevailing direction of the wind is mendosal, usually from the south in the morning, and frequently from the north in the evening, but over the summit of Cotopaxi, at a height of 18,000 feet, the north-west wind always prevails throughout the day. The gradually-widening volcanic cloud continually takes a south-eastern direction over the rim of the crater, at a height however, about 21,000 feet, it suddenly turns to the north-west, and maintains that direction till it reaches a height of at least 28,000 feet. There are thus from the foot of the volcano to the highest point attended by its smoke-cloud three quite distinct regular currents of wind." The principal product of the Cotopaxi eruptions is pumice-stone; and the flanks of the mountain are covered with deep beds of this material mangled with trachyty rocks. In the vicinity fragments of obsidian are common in great profusion. Llanganati and Cerro Hermoso have been little visited except by natives in search of the golden treasures of the Incas believed to be hid in one of its lakes; and even their curiosity was quenched by the mysterious fate of Pastron Longa. Its height is 17,483 feet, and it is said by Villacceo to contain large quantities of pyrites. In regularity of structure the cone-shaped summit of Tunguragua is similar to Cotopaxi, but attains an altitude of 17,663 feet above the Pacific. It is, and, as much as it rises directly from a plain only 5700 feet above the sea, has the appearance of being much more ancient, or in an earlier stage of its activity than from the structure of the latter, the mountain. Cotopaxi, from its heart-shaped appearance, is equally destined to a crater. So much so, that Wagner, in 1844, the Cordillera only 6000 feet above it, reached the summit, 18,700 feet, and observed that smoke was emitted, accompanied by a catalastic fed by the snows on the cone. Its summit, 17,395 feet above the sea, is the culminating point of the Andes. The "Mountain of the volcano," as Humboldt, a height of 21,420 feet, and long regarded as the culminating point of the Andes. The fact that it only makes the ascent of the "Mountain of the volcano," as Humboldt, a height of 21,420 feet, and long regarded as the culminating point of the Andes. The fact that it only makes the ascent of the "Mountain of the volcano," as Humboldt, a height of 21,420 feet, and long regarded as the culminating point of the Andes. The fact that it only makes the ascent of the "Mountain of the volcano," as Humboldt, a height of 21,420 feet, and long regarded as the culminating point of the Andes. The fact that it only makes the ascent of the "Mountain of the volcano," as Humboldt, a height of 21,420 feet, and long regarded as the culminating point of the Andes. The fact that it only makes the ascent of the "Mountain of the volcano," as Humboldt, a height of 21,420 feet, and long regarded as the culminating point of the Andes. 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place by several distinct mouths. For some distance beyond the mouth of the Coca the channel is navigable for steam-boats, and the natives proceed in canoes as far as the Catacan del Canda, 5393 feet above the sea-level. The Coca, which descends from the Pimampiro Cordillera in the northern limits of the country, has a course of about 420 miles. The Coca, rising in the neighbourhood of Cayambe and the Guaman Mountains, receives the Maspa and the Cosanga, flows eastward along the line of the equator as far as 78° 10' W. long, turns southward, takes a leap of 137 feet, and maintains the same direction till it reaches the Napo rather as a rival than a tributary. The Napo system thus drains a district extending from 1° N. to 3° S. lat. and from 78° 10' to 73° 50' W. long. The only other Ecuadorian tributary of the Amazon that has any claim to special notice is the Pastaza. Instead of having its head-waters in the eastern slopes of the Eastern Cordillera, as is the case with most if not all of the rivers already described, it rises in the central plateau, within the shadow of Cotopaxi, forces its way through the range to the north of Tunguragua, and flows south-eastwards past the roots of Sangi, augmented from stage to stage by the numerous torrents that are fed by the eternal snows. It bears the name of Patate till its junction with the Chambon in the neighbourhood of Baños, and is not recognized as the Pastaza above the Agoyan falls. As early as 1741 it was navigated without difficulty by Don Pedro Malundado; and it is believed that it would afford a passage for steam-boats for a distance of 314 miles. Mr. Simson, one of the most recent explorers of eastern Ecuador, gives a graphic account of the terrific floods to which its mountain tributaries, and more especially the Topo, are subject. The rise of the waters is sometimes sudden, and their fury so irresistible, that trading parties are imprisoned for weeks in the narrow strip of land between one torrent and the next; and the whole country is traversed in the line of the currents by long ridges, or esquillas, produced by the disintegration and removal of all the intermediate tracts. The same, indeed, holds true more or less of the whole eastern slope of the mountains and of the upper sections of all the rivers. On the western versant of the Ecuadorian Andes there are three river systems of considerable size—the Mira, the Esmeraldas, and the Guayasquil. The first has its head-waters—the Rio Blanco, the Pisco, and the Punta—of the province of Ilindisu, breaks through the Western Cordillera, receives from the left the San Pedro, Paramua, Cachiayacu, Chachavi, Canumbi, and from the right the San Juan, Guapi, and Nuple, and empties itself by several mouths into the Pacific near the island of Tumaco. The second, which is the largest of the three, collects its abundant waters from Cotopaxi and Sincholagua, the transverse ridge of Tiupulo or Chisnécho, Ilindisu, Pichincha, and Cayambe. The Cotopaxi tributary, known as the Rio Pecu, forms three beautiful cascades, the highest of which is about 220 feet. To the Guayasquil system belong the Daule, the Babahoyo, and the Yaguarcocha, with their numerous tributaries,—the Daule rising in the Sandono ridge, the Babahoyo in the slopes of the Western Cordillera, and the Yaguarcocha in the skirts of Chimborazo. They are all navigable for some distance inland by steamer, and are of great importance in connection with the transport of native produce to the port of Guayasquil. Floods are usual in the rainy seasons, and vast areas are laid under water. In the Daule the tide is felt at Cayalalara, 25 miles inland. Along the coast, between the mouth of the Esmeraldas and the Gulf of Guayasquil, a large number of streams find their way to the sea; but as they all have their sources in the comparatively insignificant line of hills that runs north and south about 25 or 30 miles inland, they are themselves comparatively insignificant.

Lakes.—While Ecuador can boast of nothing worthy of the name of an inland sea, it possesses a large number of lakes, either lying in the Iaps and extinct craters of the Andes, or formed in the lowlands by the overflow of its rivers. To the former class belong San Pablo, at the foot of Imbabura, 5 miles in circumference; Cuy-cochas, on the south-east skirt of Cotocachi, 10,200 feet above the sea, and thus one of the highest lakes in the world; Yaguar-cochas, or “Lake of Blood” not far from Ibarra; Queros, about 4600 feet in diameter; Colea, to the east of Riobamba, with a powerful whirlpool in the centre; and Colay, to the south of Riobamba, which exhales gases poisonous enough to stupefy the birds that attempt to cross, and thus helps to fill the larder of the Indians in its neighbourhood. The largest specimens of the second class lie along the Napo. Thermal springs are mentioned in numerous localities,—as at Blerenco and San Pedro del Tingo, north-east of Quito; at Cachilacta, in the district of Nanegal; in the skirts of Ruminahui; at Timbuctuyopyo, near Tacuna; on the slopes of Chimborazo; and at Balos, near the foot of Tunguragua.

Minerals.—Ecuador is less rich in minerals, especially in the precious metals, than any other of the South American states. Silver, gold, iron, mercury, lead, tin, zinc, copper, antimony, manganese, alum, sulphur, and salt are all said to be found; but very few of these exist in sufficient quantity to affect the destinies of national industry. Gold mixed with silver has long been obtained in the neighbourhood of Zaruma, in the province of Loja, and it is gathered by the Indians from the river beds in the Napo and Canosol territory, and more particularly from the Bobonaza. The gold of the Canelos is about 23 carats fine, and that of the Napo 20. The town of Azogues derives its name from its prolific quicksilver mines; and similar deposits are worked within the city of Loja. In the pueblo of Simiatug, to the south-east of Riobamba, the natives manufacture sal from brine springs, and export it under the name of sal de Tavamora; the producer of Salinas—a name which tells its own tale—in Imbabura, finds its way along the Napo. Coal of good quality occurs in the province of Cuenca and also on the banks of the Napo near Pucarú, the “Red Mountain." Marble, alabaster, gypsum, slate, and other industrial rocks are obtained in various localities; beautiful rock crystal is worked at Chongon, in the province of Guayaquil; and in the coast districts there exist considerable deposits of asphalt.

Climate.—The description already given of the position and vertical arrangement of the country implies the main characteristics of Ecuadorian climate. The snow-line varies considerably in the different seasons of the year, as well as according to the form and situation of the individual mountain. Wagner found it in May on Cotocachi, 15,788 feet high; on Guaynas-Pichincha in June, 15,741; on Mroz-Pichincha in May, 15,762; on Ilindisu in December, 15,494; on Carahuirazo in January, 15,888; on Tunguragua in February, 15,914; and on El-Altar in February, 15,654. The greatest difference, according to his observations, existed between the south side of Cotopaxi (15,279 feet) and the north side of Chimborazo (15,914). This elevation of the snow-line—so great when compared with its European position—of course renders possible the existence of vegetable and animal life at a correspondingly great height. While St. Bernard’s, the highest point of permanent human habitation in Europe, is only 8377 feet above the sea, most
of the towns and villages of the central plateaux from Ibarra to Cuenca lie between 8500 and 9500 feet, many of the huts of the cattlemen are at a height of from 11,500 to 12,800; and the loftiest of these, at Cumayaco, on the north side of Chimborazo, in 1° 29' S. lat., stands no less than 13,396 above the sea. The temperature of these upland districts is of course comparatively low. "At Quito," says Professor Orton, "it is neither spring, summer, or autumn, but each day 18 a transitional position of the country is the main factor, and accordingly at Guayaquil we find the thermometric mean is 98°, the range in the 24 hours about 10°, the annual maximum 70°, and the annual minimum 45°. In the lower coast regions the tropical position of the country is the main factor, and accordingly at Guayaquil we find the thermometric mean is 98°, and during the rainy season the oppressive and pestiferous air "reminds the geologist of the steamy atmosphere of the Carboniferous period." The rainy season, or invierno, in Ecuador continues from December to May, with a short period of dry weather called the veranillo shortly after the December solstice. The rest of the year forms the sereno, or summer, which, however, is in like manner interrupted by a little rainy season called the esternilla, or CordHZno de San Francisco, after the September equinox. The mean annual rainfall at Quito is 70 inches. In the coast region the two seasons are not very distinctly marked - in the invierno the sky is sometimes perfectly cloudless, while during the veranillo there occasionally falls a continuous drizzle called garua According to Villavicencio, a gradual diminution of rain has been observed in this district of irregular seasons, and he predicts the assimilation of its climate to that of the rainless coasts of Peru. On the eastern side of the Andes, on the other hand, rain occurs almost at any time of the year, and almost every morning the woods are watered by the gentle showers of the rocita. During the veranillo the Cordilleras and montes are visited by violent hailstorms, and winds of almost incredible force sweep across the winter scene. In its relation to human health the climate of the upland region is interesting. Goitre is common; and it is found necessary to maintain three large hospitals for lepers. Tubercular disease of the lungs, on the contrary, is said to be completely unknown 8000 feet above the sea, while it is one of the most frequent of diseases in the coast districts of Tropical America. The effects on the human organism of the ascension of the loftier summits are very variously described, owing doubtless to individual differences of constitution. One thing seems established, - that the pugnacious instinct of both men and the lower animals is greatly weakened.

**Botany.** - The flora of the Quitoan plateau has been well explored by various European botanists, and more especially by Dr. Jameson of the university of Quito, that of the western slopes and lowlands is less perfectly ascertained; and that of the rough-wooded country stretching eastward from the Andes is still in great part undescribed. From the coast of the Pacific upwards to a height of about 3000 or 4000 feet, the vegetation is distinctively tropical, including among its economical species the banana, the sweet potato, rice, maize, the bread-fruit tree, mulgo, cotton, cocoa, the yam, the mandio, and the sugar cane. Most of these become rare above 3000 feet, but a few, like the sugar cane, are cultivated as high as 8000. Few parts of the world can vie in richness of vegetation with the alluvial valley of Guayaquil, which in the matter of fruit trees alone produces plátanos, pomegranates, shaddock, oranges, lemons, apricots, charimoyas, pultas, granadillas, tunas, mangoes, pacaes, and many others of less importance. Between 6000 and 10,000 feet above the sea the European cereals are successfully cultivated, along with the chick-pea, the broad-bean, the cabbage, the guinea (Chenopodium Quinoa), potatoes, Oryza, Bauhinia, and Pouteria. Wheat will not form the ear lower than at 4500 feet, or ripen higher than at 10,500; but barley and rye can be grown at a still greater elevation. The oak, the elm, the ash, and the beech never descend lower than to 5500 feet, and are seldom found higher than 2200. Further up, the larger forest trees, except the pine, begin to disappear; but the *Exallonea myrtaformis* is met with at an elevation of 13,000; and the shrubby *Esparus* ascend 400 or 500 feet higher. In the treeless region that lies between 11,600 and 13,500, or in other places between 12,000 and 14,000 feet, the similarity of the vegetation of that of the corresponding European region is, according to Wagner, especially striking. In the paramos of Chimborazo, Pichinchas, Imbaza, &c., the relation of characteristic genera to those identical with genera in the Alpines flora of Europe is as 5 to 4, and the botanist might almost suppose himself in the Upper Engadine. As the region of cryptogams does not properly begin till about 17,000 feet on Cayambi and Chimborazo, most of the summits of the Cordilleras, failing, as they do, to reach this elevation, yield a considerable harvest of phanerogamous plants. Bousangault discovered a species of *Saxifraga* (Saxifraga Bousangaulti) at a height of nearly 16,000 feet on Chimborazo, and Wagner found the trachytic rocks of Pichinchas, Imbaza, and other peaks, far above the snow-line, covered in many places with the gonda-plant, or *Oleostium nudale*, *II*. The species in those upper regions are frequently very remarkable, and a large number of strangely-modified forms have been collected from the crater's of the volcanoes.

In its forest lands alone Ecuador possesses almost insatiable resources. Seven different species of cinchona are known to exist within its borders, the *Ceroxylon andricus* and many lesser species of palm abound on both sides of the Cordilleras; and redwood, Brazil wood, palo de cruz, guanacu or holy wood, ebony, cedar, and aguana are a few of the more usual timber trees. In the dripping forests of the west grows the sumis-caspi, which forms excellent fuel even in its moistest condition. Copal, dragon's blood, India-rubber, storax, and several valuable dye-stuffs are obtained from indigenous plants. The cabuya or agave, the *San Jose palm*, *II*, yield textile fibres; and the leaves of the *Alhakan* plant (*Corallodona palmata*) and the *mocora*, a cocoa-nut-like tree, furnish material for the well-known hats.

**Zooloy.** - The fauna of Ecuador does not present a great variety among the mammals; but the birds, and still more the insects, are very numerous. The jaguar, the puma, the ounce, and the ocelot are the chief representatives of the cat tribe, monkeys of various species are common; the four characteristic animals of the Andean range, the llama, the guanaco, the vicuna, and the alpaca, are fairly abundant; large birds and flocks of European cattle and sheep are found in the rich pasture of the paramos, and horses, asses, and mules are reared in sufficient numbers to be articles of export. Few rivers are more densely peopled with alligators than the Guayayquil and Esmeraldas; and several of the largest species of snakes are natives of the warmer regions of the country, though in the Cordilleras and plateaux the reptilia are very rare. The condor, the turkey buzzard, the gallinazo, the crane, and the pelican are among the larger birds; and ducks, pheasants, and partridges are not uncommon. Of the lesser birds perhaps none appears in such number and such striking variety of form and colour as the humming bird, which is found frequently at a great height on the mountains. The flaxer or flute-bird is especially noticeable for the artistic character of his song. That the entomologist finds a rich harvest of coleopterous insects in the low countries is in keeping.

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1 See his *Sympbron Plantarum Equatorianorum*, 2 vols.
with what might be expected; butterflies are so numerous in some parts as even to surpass the veteran collector; and in certain favoured regions, mosquitoes, sand-flies, and the equally troublesome pumas scourge as prolific as their ancient congeners in Egypt. The silk-worm has been successfully introduced, but bee-keeping is as yet practically unknown. The ethnology of Ecuador, and more particularly that of the rivers of the Amazon system, is very partially ascertained; but the species of the two vespers seem to be quite distinct. According to Wagner's investigations the distribution is mainly vertical, and to the N. of Chumborazo alpine forms go as high as 15,400 Paris feet; the forms of the lower region (or under 1000 feet), are closely connected with those of Brazil and Guiana; more peculiar genera appear in the middle region (from 1000 to 7700 feet), and the upper region is exclusively occupied by characteristic and frequently very strangely-shaped genera; the number of species is comparatively small, and that of individuals great only in the lower parts of the rivers.

Produce and Industries. — The finest article of foreign export is cotton, of which two kinds are especially distinguished in the market—the fine "up-river" quality and the so-called Machala quality. Spain is the greatest purchaser, then England, Germany, and Peru and Chili. In 1874 the total quantity that left the country was 440,091 Th., valued at 2,752,361 pesos, or, taking the peso as equal to 4s. 2d., £573,412. The collection of income-tax, 67,451; duty on sale of land, 216,110; rice, 19,744 pieces, at 88,848 pesos; dried skins to the amount 312,785, gunpowder monopoly, 57,000; stamps, 91,200; tithes, 91,200; and numerous others. In 1877 the national debt amounted to 16,970,968 piastres (or £457,724), of which £1,242,000 was the English loan stock in 1865.

Artificial means of communication are still for the most part primitive; a very few wagons convey, though no countries have canals, so little reason to be content with their natural highways by land or water. Many of the roads, even between important centres of population, are mere mule-tracks, a little improved by the weather it may be for weeks or months at a time; while the violent torrents which have so frequently to be crossed often present something better than more than one bridge to the question or amurp of the Kamshans. The simplest of these is the faruwa, consisting of a single tight rope, with or without a travelling rope by which the passenger or his luggage may be hauled across; the most complex is the chiims-chaon, a rude prototype of the regular suspension bridge, constructed of four or five ropes of apeco-root fibre, supporting transverse layers of bamboo. The best are hazardous to all except a practised foot, and they go out of repair in a few years. Since the middle of the century something has been done to improve this state of affairs; and a very great deal more has always been about to be done. According to Moreno's address to congress in 1876, Ecuador had at that time 90 miles of railway, nearly 200 miles of cart-road with substantial bridges, and about 250 miles of roads fit for the ordinary mule-traffic of the country. The total length of the constructors is exclusively occupied by the inland districts, the transport of goods of every description being effected by porters or mules. The first carriage was introduced into Quito in 1866, and the owner had to pay tax for his innovation.

With the partial exception of such rude forms of relief as still linger over the semi-civilised Indians, the only religious body is the Roman Catholic. Nowhere in modern times have Jesus and priests had more their own way. Even in 1876 Dr Borrero said "the influence of the Church is still paramount, and it is expedient to declare that he would protect the religion of his fathers, which he believed had not an enemy in all Ecuador." Two years before, in spite of the extremely depressed state of the finances, ten per cent. of the part of the church revenue belonging to the state was assigned to the Pope as an annual offering. The oath of a Protestant has no value in the courts of justice; and it was regarded as an extraordinary stretch of liberality to allow the formation of a Protestant burial-ground at Quito in 1867. Monkish orders that lost their influence in Europe centuries ago still flourish in Quito—Trinitarians, Dominicans, Augustinians, Brown Franciscans, Black Franciscans, Lazarists, &c. According to Villavicencio, the number of the regular clergy at the time he wrote was 344, and of nunis 391. Quito is the seat of an archbishop, and there are bishoprics for Cuenca, Loja, Ibarra, Rie schamba, Guayaquil, and Manabi.

Education has hitherto been left in the hands of the clergy, and Education primary education is consequently in a very defective condition. There has long been a university at Quito with about a dozen professors and nearly 300 students; and in 1876 an academy was instituted in the city in accordance with the decree of the Spanish academy of Madrid. There are colleges in the larger towns, and public schools have been established all over the country. The normal school at Guayaquil is open to Indian children.

The administrative purposes the country is divided into eleven Provinces provinces—Anay, with 149,103 of a population in 1871; Chumbe rano, 110,860; Funchino, 102,921; Guayas, 87,427; Ibarra, 77,879; Leon, 78,194; Tunguragua, 72,149; Los Rios, 61,923; Loja, 60,784; Manabi, 56,098, Esmeraldas, 8000. Besides the capital, whose inhabitants are variously estimated at 30,000, the largest cities are—Guayaquil, from 16,000 to 25,000, Tungurahua, from 16,000 to 25,000, Cuenca, about 15,000; Riobambas and Ibarra, both perhaps about 16,000; Ambato, about 10,000, Olavalo, about 8000; Guaranda, 9000; and Cotacachi, 4000.

Antiquities. — Throughout Ecuador there are still considerable Anti- remains of the architectural and artistic skill of the anti-European quites period. At Caxar, to the northeast of Guayaquil, is a piece, a circular rampart of finely hewn stone, including an open area with a roofless but well-preserved building in the centre; not far off is the Juncu-chungana, a very much smaller enclosure, probably the remains of a pavilion; and in the same neighbourhood the image of the sun and a small cabinet are carved on the face of a stellated Inta-huasi. Near the upper river Torces, to the south of the Esmeraldas there are remains at Paltamata to a temple and a conical tower, the buttresses of a bridge composed of stone and mortar, portions of a great canal, and numerous houses, which mummies and plates of silver have been obtained. At Han tumas similar sepulchral mounds, called tolas, may be seen, as traces of military structures. At the height of 12,500 feet, the Cotopaxi, at a height of 6568 feet, the ruins of an Inca palace, Fushania, are utilized by the kasenda; and a conical hill at its foot is supposed to be of artificial construction. Another fortress and palace are preserved at Pomezlillas, and in the
neighbouring pueblo of Achupallas an ancient temple of the sun now serves as parish church.

History.

The territory of the present republic of Ecuador, when first it became dimly visible in the gray dawn of American history, appears to be inhabited by upwards of fifty independent tribes, among which the Quitos were the most important. About 200 A.D. a foreign tribe is said to have forced their way inland up the valley of the Esmeraldas, and the kingdom which was founded at Quito lasted for about 1200 years, and gradually extended, both by war and alliance, over many of the neighbouring dominions. In 1469, during the reign of the fourteenth Chimu, or Lord of the Valley, the conquest of Quito was undertaken by Tupa Yupanqui, the Inca of Peru; and his ambitious schemes were not long after his death, completely carried out by his son Huascar-Casca, who inflicted a decisive defeat on the Quitomans in the battle of Hatun-taqui, and secured his position by marrying Fucha, the daughter of the late sipher. By his will the conqueror left the kingdom of Atahualpa, his son by this alliance; while the Peruvian throne was assigned to Huascar, an elder son by his Peruvian consort. War soon began between the two kingdoms, owing to Huascar's pretensions to supremacy over his brother, but it ended in the defeat and imprisonment of the usurper, and the establishment of Atahualpa as master both of Quito and Cuzco. The fortunate monarch, however, had not long to enjoy his success; for Huascar and his Spanish wife were already at the door, and by 1533 the fate of the country was sealed. As soon as the confusion and involve of the first occupation were suppressed, the recent conquest of the Quito province became a reality. The independence began to manifest itself throughout the Spanish colonies of South America. Quito did not remain altogether independent. The Quichuan doctor Eugenio Espejo, and his fellow-exterminates Don Juan Pio Montefaur, entered into hearty co-operation with Narbho and Zeno, the leaders of the revolutionary movement at Quito. When, towards the close of the century, the desire for independence began to manifest itself throughout the Spanish colonies of South America, Quito did not remain altogether independent. The Quichuan doctor Eugenio Espejo, and his fellow-exterminates Don Juan Pio Montefaur, entered into hearty co-operation with Narbho and Zeno, the leaders of the revolutionary movement at Quito. When, towards the close of the century, the desire for independence began to manifest itself throughout the Spanish colonies of South America, Quito did not remain altogether independent. The Quichuan doctor Eugenio Espejo, and his fellow-exterminates Don Juan Pio Montefaur, entered into hearty co-operation with Narbho and Zeno, the leaders of the revolutionary movement at Quito. The typhon, however, came to a sudden close in 1576, when the independence of Quito was proclaimed by three of his private enemies. The consequent election resulted in the appointment of Dr Borrego, who, on his address to the Congress, December 14th, 1875, left the country under the constitution of the responsible office to which he had never aspired, full political liberty and the freedom of the press! An insurrection headed by Venzettini, the military president, had already broken out, and on the 14th December the Government forces under Aparicio were completely routed at Galte.

EDDA---EDD

he sent under Flores to recast the enclosures of Mompox, the present of New Granada, was completely routed. His first regiment in 1644 was refused, but the desultory acts by which he sought to establish a dictatorship only embittered his opponents. In 1646 he retired from office. While he had endeavoured to develop the material resources of the country and to introduce retrograde measures in regard to religion and education. The principal event in the short presidency of his successor, General Juan larrain (1657), was the war with Chili and Peru against Spain, and the banishment of all Spanish subjects. Several important changes were made by congress in the period between his successor's death and the election of Exequias. Jan 1668 the power of the president to impose personal taxes was abolished and the public office was annually renewed. Next year a revolution at Quito, under Moreno, brought Exequias's presidency to a close, and though the national convention appointed Carvajal to the vacant office, Moreno succeeded in securing his own election in 1670 for a term of six years. His policy had undergone no alteration since 1656 the same persistent endeavour was made to establish a religious despotism, in which the supremacy of the president should be subordinate only to the highest supremacy of the clergy. The tyranny, however, came to a sudden close in 1676, when the president was murdered in Quito, by three of his private enemies. The consequent election resulted in the appointment of Dr Borrego, who, on his address to the Congress, December 14th, 1875, left the country under the constitution of the responsible office to which he had never aspired, full political liberty and the freedom of the press! An insurrection headed by Venzettini, the military president, had already broken out, and on the 14th December the Government forces under Aparicio were completely routed at Galte.

EDAM, a town of the Netherlands, in the province of North Holland and arrondissement of Hoorn, about 11 miles north-east of Amsterdam, and lying a mile from the junction of the two branch canals. It has a fine town-house, an exchange, and a fish-market, and one of its two Reformed churches is adorned with stained glass, and ranks among the most beautiful buildings of the kind in the province. Shipbuilding, rope-spinning, and sail-making are carried on, and the place gives its name to a well-known description of "sweet-milk" cheese—Zoemelkaas. It was at Edam that nearly the whole of Admiral De Ruyter's fleet was constructed. Population of the commune in 1869, 5152, and of the town 3556.

EDDA, the original signification of which is "great-grandmother" is the title given to two very remarkable collections of old Icelandic literature. Of these only one bears that title from antiquity; the other is named by a comparatively modern moniker who only works by that name to the ancients was the miscellaneous group of writings attributed to Snorri Sturluson (1178-1241), a scholar of Jon Lofthson, and the greatest name in old Scandinavian literature. It is more correctly known as the Uppsala Codex, transcribed about forty years after his death. The collection of Snorri is now known as the Prose VIII. - 2.
or *Younger Edda*, the title of the *Elder Edda* being given to a book of ancient mythological poems, discovered by the Icelandic bishop of Skalholt, Brynjulf Sveinsson, in 1643, and erroneously named by him the *Edda of Snorri*. 1. The *Prose Edda*, properly known as *Edda Snorra Sturlusonar*, was arranged and modified by Snorri, but actually composed, as has been conjectured, between the years 1140 and 1160. It is divided into five parts, the Prose or *Forfald*, *Gylfaginning*, *Bragararvætur*, *Skáldskaparmál*, and *Háttatal*. The prose bear a very modern character, and simply gives a history of the world from Adam and Eve, in accordance with the Christian tradition. *Gylfaginning*, or the Delusion of Gylfi, on the other hand, is the most precious compendium which we possess of the mythological system of the ancient inhabitants of Scandinavia. Commencing with the adventures of a mythical king Gylfi and the giantess Gefjon, and the miraculous formation of the island of Zealand, it tells us that the Åsir, led by Odin, invaded Svithjod or Sweden, the land of Gylfi, and settled there. It is from the *Ynglingsaga* and from the *Gylfaginning* that we gain all the information we possess about the conquering deities or heroes who set their stamp upon the religion of the North. Advancing from the Black Sea northwards through Russia, and westward through Esthonia, the Åsir seem to have overrun the south lands of Scandinavia, not as a horde but as an immigrant aristocracy. The Eddaïc version, however, of the history of the gods is not so circumstantial as that in the *Ynglingsaga*. It is, on the other hand, distinguished by an exquisite simplicity and archaic force of style, which give an entirely classical character to its mythical legends of Odin and of Loki. *Gylfaginning* is written partly in prose, partly in verse, with brief poetical insertions. *Bragararvætur*, or sayings of Bragi, are further legends of the deities, attributed to Bragi, the god of poetry, or to a poet of the same name. The *Skáldskaparmál*, or Art of Poetry, commonly called *Skáld*, contains the instructions given by Bragi to Eggun, and consists of the rules and theories of ancient verse, exemplified in copious extracts from Eyríndr Skálapsalir and other eminent Icelandic poets. The word *Skáldskapr* refers to the form rather than the substance of verse, and this treatise is almost solely technical in character. It is by far the most important of the sections of the *Edda of Snorri*, and comprises not only extracts but some long poems, notably the *Thorðermál* of Eilífr Guðnason and the *Hauktvang* of Thjóðólfr. The fifth section of the *Edda*, the Háttatal, or Number of Metres, is a running technical commentary on the text of Snorri's three poems written in honour of Hískon, king of Norway. Affixed to some MS. of the Younger *Edda* are a list of poets, and a number of philological treatises and grammatical studies. These belong, however, to a later period than the life of Snorri Sturluson.

The three oldest MSS. of the prose *Edda* all belong to the beginning of the 14th century. The Wurm MS. was sent to Ole Wurm in 1628; the Codex Regius was discovered by the indefatigable bishop Brynjulf Sveinsson in 1640. The most important of the two is the *Upsal Codex*, an octavo volume written probably about the year 1300. There have been several good editions of the *Edda Snorra Sturlusonar*, of which perhaps the best is that published by the Arno Magnus Society in Copenhagen in 1848, in two vols., edited by a group of scholars under the direction of Jón Sigurðsson.

2. The Elder *Edda*, Poetic *Edda*, or *Svemundar Edda* hina frøða was entirely unknown until about 1643, when it came into the Skálaholt, Brynjulf Sveinsson, who, puzzled to classify it, gave it the title of *Edda Svemundar multeci*. Svemund Sigfusson, who was thus credited with the collection of these poems, was a scion of the royal house of Norway, and lived from about 1065 to 1132 in Iceland. The poems themselves date in all probability from the 8th or 9th centuries, and are many of them only fragments of longer heroic chants now otherwise entirely lost. They treat of the most glorious legends of an early Scandinavian civilization, and are composed in the simplest and most archaic forms of Icelandic verse. The author of no one of them is mentioned. It is evident that they were collected from oral tradition; and the fact that the same story is occasionally reported under varied form, and that some of the poems themselves bear internal evidence of being more ancient than others, proves that the present collection is only a gathering made early in the Middle Ages, long after the composition of the pieces, and in no critical spirit. Sophus Bugge, indeed, one of the greatest living authorities, absolutely rejects the name of Æsmund, and is of opinion that the poetic *Edda*, as we at present hold it, dates from about 1240. There is no doubt that it was collected in Iceland, and by an Iceland, the most remarkable and the most ancient of the poems in this priceless collection is that with which it commences, the *Voluspa*, or Prophecy of the Volva or Sibyl. In this chant we listen to an inspired prophetess, "seated on her high seat, and addressing Odin, while the gods listen to her words." She sings of the world before the gods were made, of the coming and the meeting of the Åsir, of the origin of the giants, dwarfs, and men, of the happy beginning of all things, and the end which shall be in the chaos of Ragnarok. The latter part of the poem is understood to be a kind of necromancy,—according to Vígufsson, "the raising of a dead volva," but the mystical language of the whole, its abrupt transitions and terse condensations, and above all the extinct and mysterious cosmology, its unaccountability with which it presupposes nothing less than an exact interpretation of the *Voluspa* extremely difficult. The charm and solemn beauty of the style, however, are irresistible, and we are constrained to listen and revere as if we were the auditors of some fugal music devised in honour of a primal and long-buried race. The melodies of this earliest Icelandic verse, elaborate in their extreme and severe simplicity, are wholly rhythmical and alliterative, and return upon themselves like a solemn incantation. *Hvammr*, the Sayings of the High One, or Odin, follows next; this contains proverbs and wise saws, and a series of stories, some of them well known, told by Odin himself. *The Vigtardsmímal*, or sayings of Víulsáfni, is written in the same mystical vein as *Voluspa*; in it the giant who gives his name to the poem is visited by Odin in disguise, and is questioned by him about the cosmogony and chronology of the Norse religion. *Grimnmímal*, or the Sayings of Grimnir, which is partly prose, is a tale of Odin's imprisonment and torture by king Gertrud. *For Skirmir*, or the Journey of Skirmir, *Hárvarðalíðr*, or the Lay of Harvarð, *Hymskála*, or the Song of Hymir, and *Ögislókar*, or the Brewing of Ógir, are poems, frequently composed as dialogue, containing legends of the gods, some of which are so ludicrous that it has been suggested that they were intentionally burlesque. *Thrymskála*, or the Song of Thrym, possesses far more poetic interest; it recounts in language of singular force and directness how Thór lost his hammer, stolen by Thrym the giant, how the latter refused to give it up unless the goddess Freyja was given him in marriage, and how Thor, dressed in women's raiment, personated Freyja, and, slaying Thrym, recovered his hammer. *Álvismímal*, or the Sayings of Alvis, is actually a philological exercise under the semblance of a dialogue between Thér and Alvis the dwarf. In *Vestamímal*, or the Song of Vé, Odin questions a volva with regard to the meaning of the sinister dreams of Fáðar. *Egilsmímal*, or more properly *Bíthusla*, records how the god Heimdal, disguised as a man called Rug, wandered by the seas-aborde, where he met the original dwarf pair, Ál and Edda, to
whom he gave the power of child-bearing, and thence sprung the whole race of thralls; then he went on and met with Ash and Amma, and made them the parents of the race of churl; then he proceeded until he came to Fafnir and Modir, to whom he gave the first of free men, whom he himself brought up, teaching him to shoot and shun, and to use the sword and runes. It is much to be lamented that of this most characteristic and picturesque poem we possess only a fragment. In Hyndluljóð, the Lay of Hyndla, the goddess Freyja rides to question the völva Hyndla with regard to the ancestry of her young paramour Ótar; a very fine quarrel ensues between the prophetess and her visitor. With this poem, the first or wholly mythological portion of the collection closes. What follows is heroic and pseudo-historic. The Volsungarvölk, or Song of Volsundr, is engaged with the sufferings and adventures of Volsundr, the smith-king, during his stay with Nursed, king of Sweden. Volsundr, identical with the Anglo-Saxon Weland and the German Welant, is sometimes confounded with Odin, the master-smith. This poem contains the beautiful figure of Svanhvít, the swan-maiden, who stays seven winters with Volsundr, and then, yearning for her fatherland, flies away home through the dark forest. Helgaðisvölk Hvarvótt Sonar, the Song of Helgi, the Son of Hvarvótt, which is largely in prose, celebrates the wounding of Helgi by Svan, who, like Atlantus, ends by loving the man with whom she has fought in battle. Two Songs of Helgi the Hunding’s Bane, Helgaðisvölk Hundingbana, open the long and very important series of lays relating to the two heroic families of the Volsungs and the Niblings. Including the poems just mentioned, there are about twenty distinct pieces in the poetic Edda which deal more or less directly with this chain of stories. It is hardly necessary to give the titles of these poems here in detail, especially as they are, in their present form, manifestly only fragments of a great poetical saga, possibly the earliest coherent form of the story so universal among the Teutonic peoples. We happily possess a somewhat later prose version of this lost poem in the Volsungasaga, where the story is completely worked out. In many places the prose of the Volsungasaga follows the verse of the Eddaic fragments with the greatest precision, often making use of the very same expressions. At the same time there are poems in the Edda which the author of the saga does not seem to have seen. But if we compare the central portions of the myth, namely Sigurd’s conversation with Fafnir, the death of Beowulf, the speech of the birds and the meeting with the Valkyries, we are struck with the extreme fidelity of the prose romancer to his poetical predecessors in the Sigurðarvölk Fafnirvölk; in passing on to the death of Sigurd, we perceive that the version in the Volsungasaga must be based upon a poem now entirely lost. Of the further extension of the myth and its corruption into the romantic epic of Der Niebelung-Nibelungenlied, this is not the place for discussion. Suffice it to say that in no modernized or Germanized form does the legend attain such an exquiste colouring of heroic poetry as in these earliest fragments of Icelandic song. A very curious poem, in some MSS., attributed directly to Saxmund, is the Lay of the Sun, Sólarljóð, which forms a kind of appendix to the poetic Edda. In this the spirit of a dead father addresses his living son, and exhorts him, with maxims that resemble those of Hávamál, to righteousness of life. The tone of the poem is strangely confused between Christianity and Paganism, and it has been assumed to be the composition of a writer in the act of transition between the old creed and the new. It may, however, not impossible, be altogether spurious as a poem of great antiquity, and may merely be the production of some Icelandic monk, anxious to imitate the Eddaic form and spirit. Finally Forsympall, or the Preamble, formerly known as the Song of Odin’s Raven, is an extremely obscure fragment, of which little is understood, although infinite scholarship has been expended on it. With this the poetic Edda closes.

The principal MS of this Edda is the Codex Regius in the Royal Library at Copenhagen. It consists of a manuscript, within 8vo., of 45 leaves. This is that found by Bishop Brysur. Another valuable fragment exists in the Arné-Magnússon collection in the University of Copenhagen, consisting of six leaves. These are the only MSS older than the 17th century which contain a collection of the ancient mythic-heroic lays, but fragments occur in various other works, and especially in the Edda of Snorr. The poetic Edda was translated into English verse by Amos Cottle in 1797, the poet Gray produced a version of the Fóstatarvölk, but the first good translation of the whole was that published by Benjamin Thorpe in 1866. An excellent edition of the Icelandic text has been prepared by Professor Hjalmar Skjærvø, commencing in 1871, and Professor Edelinck ultimately took the first rank among his examiners. His excellence was generally acknowledged; and having become known to Louis XIV. he was appointed, on the recommendation of Le Brun, teacher at the academy established at the Gobelins for the training of workers in tapestry. He was also entrusted with the execution of several important works. In 1767 he was admitted member of the Paris Academy of Painting and Sculpture. The work of this great engraver constitutes an epoch in the art. His prints number more than four hundred, and it is asserted that amongst them there is no work of poor or middling quality, although many of his subjects were poor and unworthy of the high art which he lavished upon them. Edelinck stands above and apart from his predecessors and contemporaries especially in this that he excelled, not in some one respect, but in all respects,—that while one engraver attained excellence in rendering light and shade, and others in giving colour to their prints and the texture of surfaces, he, as supreme master of the burin, possessed and displayed all these separate qualities, and that in so complete a harmony that the eye is not attracted by any one of them in particular, but rests in the satisfying whole. Edelinck was the first to break through the custom of making prints square, and to execute them in the lozenge shape. Among his most famous works are a Holy Family, after Raphael; a Penitent Magdalene, after Charles Le Brun; Alexander at the Tent of Darius, after Le Brun, a Combat of Four Knights, after Leonardo da Vinci; Christ surrounded with Angels; St Louis praying, and St Charles Borromeo before a Crucifix,—the last three after Le Brun. Edelinck was especially good as an engraver of portraits, and executed prints of many of the most eminent persons of his time. Among these are those of Le Brun, Rigaud, Philippe de Champagne (which the engraver thought his best), Santeuil, La Fontaine, Colbert, John Dryden, Descartes, &c. He died at Paris in 1707. His younger brother John, and his son Nicholas, were also engravers, but did not attain to his excellence.

EDEN, Hebrew (775, denoting pleasure or delight), was the first residence of Adam and Eve according to the Old Testament Scriptures. The passage in which its geographical position seems to be indicated (Gen. 2:8) has been from the earliest times the subject of a discussion as ingenious and elaborate as it has been fruitless. Its
general position is given as "eastward," i.e., to the east of the place where the narrative was written. Of the four rivers mentioned the Euphrates is undoubtedly the same which is still known by that name, and the Hiddokel has been almost universally identified with the Tigress. The object of commentators who have sought to put a literal construction on the passage has, therefore, been to identify the Euphrates with the Tigress, and to find two rivers which together with the Euphrates and the Tigress fail to the condition stated in Gen. ii. 10, "And a river went out of Eden to water the garden; and from thence it was parted and became into four heads." As there is no river which forms a complete source for the Euphrates, the Tigress, and two others, recourse has been had to a strained construction of one kind or other. Josephus, for example, supposes the river which is the common source to have been the ocean stream which surrounds the earth, and identifies the Pison with the Ganges and the Gihon with the Nile; and in this he is followed by many of the fathers. Calmet, Rosenmüller, and others, again, suppose the river which is the common source to have been a region of springs, and, by making the Pison and the Gihon mountain streams, place the site of Eden in the highlands of Armenia. Calvin, Huet, and Bochart place Eden in lower Babylonia, on the supposition that the Pison and the Gihon are the two channels by which the united rivers Euphrates and Tigress enter the Persian Gulf. Luther and others, such as Clericus and more recently Baumgarten, have hazarded the supposition that the flood altered the course of the streams, and thus rendered it impossible to identify the locality of Eden from the description given in Genesis. These may suffice as specimens of the almost innumerable solutions that have been offered of what is now generally admitted to be an insoluble problem. On the theory that the narrative in Genesis is veritable history to be literally interpreted, it is impossible to determine the geographical position of Eden with any approach to certainty. This impossibility fully accounts for the immense variety of the conjectures that have been put forward. It deserves mention as a curiosity of criticism that the site of Eden has been assigned by different writers to each of the four quarters of the globe, and that the particular localities assigned have ranged from Scandinavia to the South Sea Islands. The allegorical interpretations, which have been offered in great variety from the time of Philo downwards, are, of course, not hampered with any geographical difficulties. Philo supposes Eden to be a symbol of the soul that delights in virtue, the river which is the source to be good, and the four rivers to be the specific virtues of prudence, temperance, courage, and justice. Origen finds in the subject an excellent opportunity for applying his favourite allegorical method, and supposes Eden to be heaven, and the rivers wisdom. Similar interpretations, with individual variations, are given by several of the fathers who are prone to allegorize. In modern times Coleridge is perhaps the most celebrated of those who have interpreted the story of Eden as an allegory. It is to be observed, however, that this mode of explaining the narrative has found even less favour with recent interpreters than that which accepts it as literal history, meeting the obvious difficulties as best it can. The undoubted tendency of later criticism has been to discard alike the theory of literal history and the theory of allegory in favour of another, according to which the story of Eden is a mythical tradition of a kind similar to that which is to be found in the early sacred literatures of most nations. According to this view, the true explanation is to be sought for in that fruitful comparison of these various traditions as preserved in sacred scriptures, early histories, inscriptions, and otherwise. See Adam, vol. i. p. 135-6, and Pentateuch.

EDEN, The Honorable Emily (1795-1851), novelist and miscellaneous writer, was the seventh daughter of the first Lord Auckland, and was born in 1795. Happily gifted by nature, her literary faculties and tastes were fostered by a liberal education. In 1835 she accompanied her brother, Lord Auckland, to India, on his appointment as governor-general, and remained with him during his term of office, which covered the period of the Afghan war. Returning to England in 1841, she made herself favourably known as a writer by the publication, three years later, of her Portraits of the Princes and People of India. She was also author of two novels entitled The Semi-detached House and The Semi-detached Couple, first appeared anonymously under the editorship of Lady Theresa Lewis. In these works she gives clever and amusing delineations of Anglo-Indian life and manners as she saw them. In 1886 was published a series of her letters to her sister written from India, and entitled Up the Country. Her private journal, at present unpublished, is said to be still more attractive and full of sparkling anecdote and graphic sketches. Another volume entitled Letters from India, edited by her niece, the Hon. Eleanor Eden, was published in 1872. For many years Miss Eden lived at Berne, and in 1876 was one of the most frequent centres of London intellectual and fashionable life. She afterwards removed to Richmond, and there died, August 5, 1886. Her eldest sister Eleanor attracted the warm affection of William Pitt, who, however, did not feel justified in making her an offer of marriage. This was, it is supposed, the only love passage in Pitt's history. She afterwards married Lord Hobart, and died in 1881.

EDENTATA, an order of placental mammals characterized by the total absence of median incisor teeth. Such teeth as are found in edentate species are composed entirely of dentine and cement, without enamel; they likewise grow for an indefinite period, and are consequently without root; and so far as yet discovered there is no displacement of the first teeth by any second set except in a few of the armadillos. This order contains the sloths, armadillos, and ant-eaters.

EDESSA, the ancient capital of Macedonia, previously known as Aigeae, was situated 46 miles W. of Thessalonica on the banks of a beautiful stream in the very centre of the kingdom, and at the head of a defile commanding the approaches from the sea-coast to the interior of the country. It was the original residence of the Macedonian kings; and even after the seat of government was removed to the more accessible Pelia, it continued to be the burial-place of the royal family. At the celebration of his daughter's marriage in the town, Philip II. was murdered by Pausanias in 336 B.C. His greater son Alexander was buried at Memphis through the contrivance of Ptolemy; but the bodies of his grand-daughter Eurydice and her husband Arrhidæus were removed by Cassander to the ancestral sepulchre. On the occupation of the town by Erythra the royal tombs were plundered by the Gallic mercenaries. The modern city of Vodena is built on the site of Edessa, and preserves a few unimportant remains of ancient buildings. The names Aigeae and Edessa were both probably given in allusion to the full-flowing streams that form one of the principal features of the situation; and Vodena is certainly derived from the Slavonic voda, water. Full details in regard to the position of the city may be found in Tozer, The Highlands of Turkey, vol. i.

EDESSA, or, as it is now called, Urfa or Orfa, a city of Northern Mesopotamia, on the Euphrates, 78 miles W. of Diarbekr, 28 miles N. of Birejik, in 37° 21' N. lat. and 39° 6' E. long. It is surrounded with walls and towers, well preserved on the northern side, has narrow but comfortable and cleanly
EDF, streets, and displays in its bazaar not only the native woolen stuffs, pottery, and silver work, but also a considerable variety of European goods. In the principal square there is a large mosque dedicated to Abraham, who, according to Mahometan legend, was slain in the city; and in its immediate vicinity is a pond shaded by fine pomegranate trees, and cypress trees, and tenanted from time immemorial by sacred fish. The only ancient remains are those of a tower associated by tradition to Nimrod, but in the neighbourhood there exist extensive catacombs with numerous inscriptions of an early date. The prevailing language is Turkish, though more than three-fourths of the inhabitants are Christian. The population was estimated about 1796 by Oliver as from 20,000 to 24,000, by Buckingham at 50,000, and, in 1873, by Chernik at 40,000. 

The town is the capital of a district, an American French, and in connection with the former a school with about 250 pupils. The outskirt is occupied by meadows, vineyards, and mulberry plantations.

Nothing is known of the origin of Edessa. It has been suggested that the early inhabitants were Sabaeans, and that the sacred fish originally belonged to the worship of Astarta. According to the Tarquin of the pseudo-Jonathan, Jerome, and Ephraim Synagoga was identified with the Ezech of General 10, and the local tradition of the Arabs and Jews makes it the same as Ur of the Chaldees; but there is no historical basis for these identifications, though the former has received the sanction of Micahelis, Ruttmann, and Von Bethlen. The first authentic mention of the city connects it with Seleucus, who appears to have granted it autonomy, and was probably the bestowal of the name by which it is best known in history. This, according to Stephans, was taken from the Macedonian Edessa, from the abode of the water in both cities, but a modern etymologist recognizes the Syriac Haditha or New Town. Another designation, Callirhoe, found in the ancient writers, undoubtedly alludes to its fountain, and it is at least possible that this may be the derivation of its modern name—Urinh or among the Syrachs, Er Rehah among the Arabs, and Orich among the Turks and Christians. In the time of Antiochus VII., about 125 B.C., the city became the seat or centre of the Orisvoidion kingdom, founded by Oricho Bar-Chermey, and governed for centuries by a series of elective monarchs. Of these the eighth in succession, Abgar Bar-Abgar, fought against Lucullus, but afterwards sided with the Romans; the fifteenth Abgar Echeneus, as famous for the legendary correspondence with Christ reported by Eusebius, was the city plundered by Trajan's general Lusius Quettus, and the kingdom became tributary in 116 Restored by Hadrian it was finally ablished by Constantine in 317, and a Roman military colony was established with the title of Colonia Maron Edesorum. Meanwhile Christianity had been taken by the city, the first church having been built early at least as 292. By the time of Julian, the wealth of the Christians was sufficient to attract the attention of the Emperor, and in the course of the following centuries the number of monasteries and churches in the city was so increased that the name of Edessa came to be used for the whole province. At that time the city was in the province of Edessa, comprising the Eastern part of the Seleucia of Abgar, and including the towns of Abgar, Marone, and some other cities. The city was of great importance as a centre of the Christian church, and was the seat of a bishop and the see of a metropolitan. The name of Edessa was derived from the Greek Apollo, and was afterwards corrupted into Edessa, and then into Edfu.

EDFU, in Coptish Abto, from the old Egyptian Tebu, a village of Upper Egypt, in the province of Saaid, situated about a third of a mile from the left bank of the Nile, 55 miles below the cataracts of Syene, in 24° 36' 43'' N. lat. It is inhabited by about 2000 Arabs and Copts, engaged for the most part in the manufacture of earthenware, which finds ready sale all through Egypt, and is remarkable for the fineness of the pottery. In the workmen who are employed in the manufacture of the pottery, which is considered the best in the world, and is used for the ornamentation of the tombs. To the Egyptologist the spot is of extreme interest, as furnishing the most perfect specimen of an Egyptian temple, full details in regard to which may be found in the article Abydos, vol. n. p. 389. By the Greeks and Romans the city to which this splendid building belonged was known as Apollonopolis Magna, the god to whom the temple was dedicated being identified with the Greek Apollo. Under the later empire it was the see of a bishop and the head-quarters of the Legato II. Trajan. See Beloni, Narrative, 3d ed., 1832, Wilkinson, Egypt and Nubia, 1843; Lepsius, Unter den hurrgogischen Inschriften am Tempel von Edfu, Berlin, 1855; Mariette, Fouilles en Egypte, 1867.

EDGECOWTH, Maria (1767-1849), the creator of the novel of national manners and moral purpose, was the daughter, by his first wife, of Richard Lovell Edgeworth noticed below. She was born at Hare Hatch, Berkshire, in 1767, and did not see Ireland till she was twelve years old. She was educated by her father, who imbued himself with great enthusiasm to the intellectual advancement of his children. In most of her literary undertakings Miss Edgeworth had the advantage of her father's criticism, who also wrote introductions to her novels. "It is my business," he used to say, "to cut and correct, yours to write on." Many tales and essays were written by Maria for private pleasure before publication was thought of. Practical Education (1795) was a joint work by father and daughter. In 1809 appeared Castle Rackrent, which at once made for her a reputation as a national novelist. This was followed soon after by Eveline, and by the Essay on Irish Bulls, published in partnership with his father, and intended to familiarize the English public with Irish humour and pathos. The work is so thoroughly the joint-product of two minds, that Miss Edgeworth, in writing her father's life, cannot tell distinctly which parts are his, but says that passages in which classical allusions and quotations occur must be her father's, as she was "entirely ignorant of the learned languages" (Memoirs, second edition, p. 117). In 1804 appeared Popular Tales, in 1806 Leonora, in 1809 the first installment of Fashionable Tales, which were finished in 1812; in 1814 Patronage, and in 1817 Harrington, Ormond, and Comic Dramas, which failed on the stage. The death of her father, in that year, recalled her from novel writing to fulfill the sacred duty of completing his Memoirs, which were given to the world in 1820, and of which a second edition was called for in 1821. In 1822 appeared Rosamond, a Sequel to Early Lessons, a work published earlier with contributions from Mr. Edgeworth's pen. In August 1823 Miss Edgeworth visited Sir Walter Scott at Abbotsford, where she remained a fortnight; and Scott repaid this visit at Edgeworthstown exactly two years afterwards. In 1825 Miss Edgeworth further continued her tales for the young by the publication of Harry and Lucy. In 1824 appeared Helen, a Tale, her last and one of her best novels; and she afterwards wrote Orlando, a book for children. Her Letters for Literary Ladies were suggested by a correspondence between Thomas Day and her father as to the propriety of "female authorship," in which the former stoutly maintained the case. Miss Edgeworth died on the 21st of May 1849, after having lived to see her works take rank as English classics. Her influence was deep and lasting. Sir Walter Scott confesses that he was anxious to do for Scotland what Miss Edgeworth had done for Ireland; and it is said that "O'Connell regretted deeply that one so powerful did not serve Ireland as an agitator. Her society was courted by
the most distinguished of her contemporaries; and countless tourists, who visited her, returned home charmed by her lively conversation (1837 edition, page 231). She was the centre of the home in which she was the centre. With Scott she was on terms of the closest intimacy; Byron admired her works, in spite of his sarcastic reference to "Miss Edgeworth's novels stepping from their covers;" and Lord Macaulay was one of her most enthusiastic worshippers. "Among all the incidents," says Mr Travelsly, "connected with the publication of his History, nothing pleased Macaulay so much as the gratification that he contrived to give to Maria Edgeworth, as a small return for the enjoyment which, during more than forty years, he had derived from her charming writings." Macaulay mentions Miss Edgeworth's name in a note, in which he describes her delineation of King Corny, in Ormond, as "that admirable portrait." Miss Edgeworth, in a letter to Dr Holland, speaks of the "self-satisfaction, vanity, pride, surprise, I had in finding my own name in a novel."

Castle Rackrent, the first and one of the most characteristic of her novels, is lit up throughout with sunny Irish humour, Sir Condy complaining that he "was very ill used by the Government about a place that was promised him and never given, after his supporting them against his conscience very honourably." Leonard has a painful plot. It treats of the seduction of an attached husband by a professed friend of his wife. Leonard's forbearance, however, and her deep-seated love for her husband prove, in the end, too much for the hollow professions and vanity of "Olivia. The Tales of Fashionable Life include Earnest, The Don, Manoeuvring, Almeria, Vivian, The Absentee, Madame de Fleury, and Emilie de Coulanges. Earnus is a powerful story, and relates how the earl of Glanthorn was cured of the disease which gives his name to the book. There are several fine character studies, including the Esxt; M'Leod, the cool, but faithful, Scotch agent; witty Lady Geraldine; Christy, the blacksmith; and Ellinor, the Irish foster nurse, who said, on one occasion, that "if it pleased God, she would like to die on a Christmas day, of all days, because the gates of Heaven, they say, will be open all that day, and, who knows but a body might slip in unknown at this?" (1857 edition, p. 231). The Don portrays, with a realism almost too painful, the dreadful privations undergone by the poor who are unable to get in the money justly their due. Manoeuvring depicts the efforts of Mrs Beaumont, a clever, scheming, deceitful woman, to marry her son and daughter contrary to their inclinations. For a while all seems to go well with Mrs Beaumont, until she is herself entangled in her net of false lies, and finally thoroughly outwitted. Her character, and that of Mr Palmer, a wealthy merchant from Jamaica, are worthy of the author's high reputation. Almeria traces the rise of the worldly spirit in the breast of a young girl, and the debasing consequences of a passionate pursuit of fashion for its own sake, unredemed by any ennobling feature. Vivian is an admirably told story, and illustrates the terrible evils which sometimes arise from indiscretion of character. Vivian, the undeceived, brilliant, young noble; Russell, the faithful tutor, Wharton, the unscrupulous politician and voluptuary; self-willed Lord Glatinbury; prim Lady Glistenbury; and vivacious Lady Julia seem to start from the canvas. The Absentee, considered by many as Miss Edgeworth's masterpiece, is written to expose the misery entailed on the tenantry by the Irishantry, who deserted their native country for London, and who are ably managed by unscrupulous agents. The characters are among the most life-like in the annals of fiction. Lady Clonbrony makes herself exquisitely ridiculous in her vain endeavours to act the fine English lady; Lord Colambre, the hero of the novel, travels, under an assumed name, among his father's tenantry, to learn the condition of the half-dead in which they have been oppressed, and champions their cause so skilfully as to win over even Lady Clonbrony; Lady Dashfort and her daughter are wonderfully real representations of heartless women of fashion; the sufferings of the Irish peasantry are drawn with a loving and masterly pencil; and the general sadness of the work is relieved by humorous sketches as Colonel Heathcck, Sir Terence O'Fay, and Larry Brady, whose inimitable letter closes the book. Macaulay considered the scene in which Lord Colambre discovers himself to his father's tenantry the best passage of the kind since the beginning of the 22d book of the Odyssey. This is very high praise, especially when we remember that Macaulay seems to have read almost every novel—so much was he fascinated by narrative composition.

Madame de Fleury is the story of a French lady who set up a school in Paris for neglected girls. The school came to grief at the great Revolution; and its benevolent founder had to fly to England, where she was supported mainly by donations from the girls, who were instigated by Victorie, the heroine of the book. Ultimately her return to France was secured by Basile, Victorie's lover, who had obtained influence with his general through his valuable engineering knowledge. Emilie de Coulanges describes the misfortunes two French refugees had to undergo in living with Mrs Somers, an excessively ill-tempered English lady, who was generous enough with her money, but neglectful of kindness of a more delicate order. Mrs Somers's incessant outbursts of temper and reconciliations with Emilie, to be followed inevitably by fresh quarrels, are somewhat wearisome reading. The Modern Griselida, a story treating of the attempts of a wife to bring her husband to abject submission, manifests fine satiric power, and great liveliness—the dialogue being particularly animated. Patronage, which is in the same vein as the Tales of Fashionable Life, rather disappointed the critics, who concluded that Mr Edgeworth had written considerable parts of it. Thus, however, is expressly denied by Miss Edgeworth (Memoirs, ii. 323). Ormond is an Irish tale, and ranks among the best of Miss Edgeworth's works. It shows how a youth, whose education had been neglected, and whose temper was naturally impetuous, managed to reach true nobility of character. King Corny, Ormond, Sir Ulick O'Shane, Mortarty Carroll, Dora, and Mademoiselle O'Faley are masterfully creations. There is a true Irish ring about the book, although it is composed in the purest English. Helen is a novel of thrilling interest, and displays greater passion and a finer insight into the more subtle moods of the human mind than any of Miss Edgeworth's previous works. The moral is that falsehood and deceit almost invariably bring misery in their train. Although on a more elaborate scale than her other books, Helen surpasses them all in grace, charm, and lightness of touch. Such powerfully conceived characters as Lady Davenant, Helen, Cecilia, Beaucherc, Churchill, and the Claremonds, leave an indelible impression on the memory.

Miss Edgeworth's novels are distinguished by good sense, humour, and an easy flowing style. As the construction of a plot is not her strong point, she is generally more successful in tales than in lengthy novels. The vivacity of her dialogues is extraordinary; and in them her characters reveal themselves in the most natural way possible. Her books are character-studies, rather than intensely interesting narratives. Sobriety of judgment is seen throughout; and passion, romance, and passion, are never shed their lustre on her pages. Three of her sons were to paint national manners, to enforce morality, and to teach fashionable society by saturating their affairs with simplicity. One expressly calls some of her stories "Moral Tales"; but they all fall under this category. The two poles of thought in regard to the moral tendency of Miss Edgeworth's works are well represented by Robert Hall, the eminent Baptist preacher, and Monsieur Taine.
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Miss Edgeworth "does not," says Hall, "attack religion or infirmity against it, but makes it appear unnecessary by exhibiting perfect virtue without it. No books ever produced so bad an effect on mankind as the "Philosophiæ Naturalis" (Hall's Works, vol. i., 1846, appendix, note A). Monsieur Taine, again, says that "this regular presence of a moral satisfaction spoils the novel as well as the novel. It must be confessed a volume of Thackeray has the cruel misfortune of recalling the novels of Miss Edgeworth."

(English Literature, Criticisms, Notes, &c., page 37).

To Robert Hall's criticism it is to be objected that a novel is scarcely the place to explain and illustrate the systematic theology of the evangelical school; while we are not content to discuss and the French philosopher, that to burden a novel with a moral, or other special purpose, is artistically a blunder, especially when it is professedly made an instrument for the instruction of the young of Sir Walter Scott, that "his morality is not in purple patches, ostentatiously obtruded, but woven through in the very texture of the story, as the garment of the author's own noble character, which ever responded to his invention, is his" (Memorials, ii. 144). His home was now at Hare Hatch, in Berkshire, where he endeavoured to educate his son according to the method explained in Rousseau's Emile. In later life, however, he saw reason to doubt many of Rousseau's views (Memorials, ii. 574). At the same time he went on keeping terms at the Temple, and formed the greatest friendship of his life with Thomas Day—an able man, of noble character, excessively eccentric, and known to all boys as the author of Samford and Merton, which was written at Edgeworth's suggestion in 1769, on the death of his father, he gave up the idea of being a barrister; but, instead of immediately settling on his Irish estate, he spent a considerable time in England and France, more delightfully happy. Edgeworth returned to Lichfield, to Dr Erasmus Darwin's, one of his greatest friends, and at once declared his passion for Miss Honora Sneyd, which had been the cause of his flight to France two years before. They were married (1773) in the cathedral, and after residing at Edgeworth for three years, settled at Northchurch, in Hertfordshire. When six years of great domestic happiness had elapsed, Mrs Honora Edgeworth died, after recommending her husband to marry her sister Elizabeth—which he did, on Christmas Day 1780. In 1782 Edgeworth returned to Ireland, determined to improve his estate, educate his seven children, and ameliorate the condition of the tenants. Up to this point Edgeworth has told his own story. The rest of his life is written by his daughter, and opens with an account of the improvements he effected, and a lengthy panegyric on Mr Edge- worth as a model landlord (Memorials, ii. 12-36).

In 1785 he was associated with others in founding the Royal Irish Academy; and, during the two succeeding years, mechanics and agriculture occupied most of his time. In October 1787, his friend Day was killed by a fall from his horse, and this trial was soon followed by the loss of a daughter, who had just reached her Fifteenth
year. The first thing that broke the monotony of his grief was the arrival of Dr Darwin's poem, the Botanic Garden, about which the author says, "It was your early approbation that contributed to encourage me to go on with the poem" (Memoirs, ii. 113). In 1792 the health of the

of Edgeworth's sons took him to Clifton, where he remained with his family for about two years, returning in 1794 to Edgeworth's words to Lord Charlemont on the Telegraph; and his apparatus is explained in an "Essay on the Art of Conveying Swift and Secret Intelligence," published in the sixth volume of the Transactions of the Royal Irish Academy.

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croptns ripen early; two miles nearer the hills and 200 feet higher the harvest is ten days later; and at an elevation of 600 feet another week at least intervenes.

The total area in cereals was 158,186 acres. The quantity of wheat grown is gradually increasing, in 1866 it was 32,120 bushels, in 1876, 44,560 bushels in contrast to 10,123 in 1856. The average produce in the more fertile districts is 31 bushels per acre, in the poorer districts from 24 to 25 bushels. The roots of all vegetables, especially turnips, are attacked severely by the larvae of the crane-fly (Tipula oleracea), and the ears sometimes suffer from the wheat-maggot.

Of other cereals there were barley 10,153 acres in 1866, and 11,952 in 1876 (the return varying from 42 to 68 bushels), and oats 23,121 in 1866, and 21,314 in 1876. Beans declined from 826 acres in 1866 to 467 in 1876. The area of sown grasses has greatly extended, being 29,907 acres in 1866, and in 1876, 51,869 acres.

The grass-seed is usually put in with the barley crops. Near the city sewage-farm has been carried on to a remarkable extent.

The Craingentanny meadows between the city and the sea, comprising 200 acres, have been under sewage cultivation for upwards of 30 years. The produce, now consisting principally of natural grasses, is sold at from 2½ to 28 per acre, and the whole from £3000 to £4000 per annum. About 30 acres are under similar treatment at Lochend, 70 acres at Dalry, and at the Grange. The total produce of the whole area under irrigation is estimated at £6000. The acreage of turnips in 1866 was 14,517, in 1876, 13,342. About 16 or 18 tons of swedes, or 24 to 24 tons of common turnips, is considered a good crop for first-rate land. Potatoes hold much the same position as in former years, though the demand for them is not so great. A considerable quantity is despatched to England for seed purposes, while the seed required in the country is obtained from Lanark, or the neighbouring counties. The number of cattle was in 1862, 13,013, in 1876, 15,561. In the neighbourhood of Edinburgh especially flax-bearing forms a very important industry; the number of flax-cows in the county is probably 11,000 or 12,000, of which 1800 or 2000 are kept in the town or suburbs, while supply abut half of the man necessary for the local consumption. Sheep are returned as 113,478 in 1866, and 168,565 in 1876. Very few farms are bled in the county, but several of the studs are of excellent character. The Clydesdale breed predominates. Pigs form a very small item in the list of stock, and the poultry yard is of but of secondary importance only in the neighbourhood of the city. The crops rotations vary considerably in different districts. Oats, potatoes, wheat, turnips, barley, hay or pasture is a common order, while a five-course shift of oats, potatoes and turnips, barley or hay, pasture, or a six-course shift (oats, beans, wheat, turnips, barley, grass), is used elsewhere. The average size of farms is 131 acres. According to the returns, out of a total of 1012 holdings 477 did not exceed 50 acres, 116 lay between 50 and 100, 20 were over 100 and under 200, 75 were between 200 to 500, and only 20 were more than 500 acres. Of nineteen years are common, the change of proprietor is as frequent as that of the tenants, and in some cases the same tenant has continued to hold a farm under six or eight successive landlords.

The average value of the arable land is calculated at from 4 to 5 shillings the acre, that of the upland pastures at from 10 to 15 shillings. The whole of the county has been drained more or less thoroughly, and some portions twice over. Tiled and small stone houses began to be built about 1830, and in the last two or three years the demand for them has increased to about 36 feet; and since 1846 deeper drains, with pipes and collars, have been put into the intermediate furrows.

Great improvements have been effected not only in the farm-houses and stables since 1835, but also in the cottages for the labourers. The hay and straw mowings they have been largely increased, and the steam plough has hitherto been very partially adopted.

The nursery grounds of Mid-Lothian are more extensive than those of any other county of Scotland; and in the variety and quantity of their productions they are equal to any in Britain. To orchards proper there are devoted about 12,000 acres, and to fruit-drinking-machines and grading mills not uncommon. The reaping-machines have been generally adopted within the last 20 years, except for very difficult ground, or where the crop has been laid by wind or rain. The assistance of the steam plough has hitherto been very partially obtained.

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of Morton (Dalmahoy), 6944; G. K. E. Fairholm, 6200; Charles Cowan (Loganhouse), 5677; John Northwick (Crockston), 5832. The duke of Buccleuch's property, though comprising only 85 acres, is the highest on the valuation roll (£28,296, with the exception of that of the railway companies.

Minerals.—Though not a mining district par excellence, Mid-Lothian possesses a considerable amount of mineral wealth. There are 10 collieries, which in 1875 employed 2179 persons and raised 715,503 tons of coal. With the exception of 90,000 tons raised in the parish of West-Calder, this was all obtained in the valley of the Esk. In its general character the coal does not differ from ordinary Scotch coal; but a large quantity of the best cannel coal, used for making gas, is procured at Niddrie Colliery, and from the marquess of Lothian's mines at Newbattle and Dalkeith. The depth of the pits varies from 50 to 180 fathoms. On the east side of the Esk the strata lie at an angle of from 10° to 14°; those on the west side, at Niddrie and Gilmerton, at from 60° to 90°. Of blackband ironstone about 61,262 tons were raised in 1876, principally in the parishes of Lasswade and Penicuik; and 25,172 tons of fire-clay were obtained in the county. In the vicinity of West-Calder there is a large amount of shale, containing from 50 to 60 per cent. of sandstone, which have been exported to England for docks and for the supply of road-metal are scattered about three miles to the east; Musselburgh, an agricultural and fishing town near the mouth of the Esk; Dalkeith, a market-town and borough of barony; Corstorphine, with a convalescent hospital and an ancient collegiate church containing several tombs of the Forrester family, who became possessors of the fees in 1354, erected in 1404, into a principality for the eldest son of the Scottish king; Crummur, formerly a place of much more importance than now; Mid-Calder, with a church of considerable antiquity, adorned with the armorial bearings of the Sandilands family, West-Calder, Balerno, Currie, Juniper Green, and Colinton, all manufacturing villages; Liberton, deriving its name from the lepers who once were its principal inhabitants; Gilmerton, mainly inhabited by coal-miners and carters; Lasswade, Loanhead, Roslin, and Penicuik.

The population of the entire county in 1871 was 328,579, of whom 153,922 were males and 174,657 females. Excluding the boroughs of Edinburgh, Leith, Portobello, and Musselburgh, the population of the county proper numbered in 1851, 57,843 persons, and in 1871, 74,126, indicating an increase of 28 per cent. within that period. The increase occurs principally in the parishes of West-Calder, Lasswade, Colinton, Dalkeith, and Kirknewton.

Antiquities.—It is believed that Crummond was once a Roman seaport; and various objects of Roman art have been discovered in the vicinity and upwards along the bank of the Almond. On several heights are remnants of early military works—the most important being that on Dalmahoy Hill, Braidwood Castle, a modernized fort on which Hengist and Horsa. Roselin, and Penicuik, and Musselburgh, an agricultural and manufacturing town near the mouth of the Esk; Dalkeith, a market-town and borough of barony; Corstorphine, with a convalescent hospital and an ancient collegiate church containing several tombs of the Forrester family, who became possessors of the fees in 1354, erected in 1404, into a principality for the eldest son of the Scottish king; Crummur, formerly a place of much more importance than now; Mid-Calder, with a church of considerable antiquity, adorned with the armorial bearings of the Sandilands family, West-Calder, Balerno, Currie, Juniper Green, and Colinton, all manufacturing villages; Liberton, deriving its name from the lepers who once were its principal inhabitants; Gilmerton, mainly inhabited by coal-miners and carters; Lasswade, Loanhead, Roslin, and Penicuik.

The following are among the most interesting of the Roman remains in Mid-Lothian not within the limits of the larger towns and villages. Roslin chapel, founded by the St Clairs in 1446, is one of the most highly decorated specimens of Gothic architecture in Scotland, and presents a remarkable combination of peculiarities. Roslin Castle, the seat of the St Clairs, is a fine ruin, occupying a peninsula on the banks of the Esk, and must have been a very strong position before the days of cannon. Hawsmore, a little further down the stream, is interesting as the residence in the 17th century of Drummond the poet, as well as for the strange caves in the rock on which it is built. Dalhousie Castle, the seat of the earl of Dalhousie, is a modern and well-built residence in the classical style on the banks of the South Esk; and Newbattle Abbey, the seat of the marquess of Lothian, occupies the site of the ancient Cistercian monastery a few miles down the stream. Crammogill Castle is a fine ruin on a knoll three miles from Roslin.
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miles to the south of Edinburgh, which formerly was the residence of the Preston family, and afforded shelter on various occasions to Queen Mary. Bothwell Castle, also a temporary residence of the unfortunate queen, is a double tower on Middleton Burn, still bearing the marks of the old cannon balls. Crichton Castle, a mile and a quarter to the east, was the residence of the well-known family which produced the celebrated Sir William Crichton, and its ruins show "the builders' various hand." Dalmauny Castle, near Ratho, is the seat of the earl of Morton, and preserves, besides other valuable antiquities, the only extant copy of the Bible of the Scottish Parliament, and the original warrant for committing Queen Mary to Lochleven. Melville Castle, near Lauswade, the seat of the earl of Melville; Colinton House, the seat of Lord Dunfermline; Calder House, the seat of Lord Torphichen, Riccarton, belonging to Sir William Gibson Craig, Bart. and Lauriston Castle, once occupied by John Law of Mississippi notoriety, may also be mentioned. Temple, on the South Esk, was at one time the chief seat of the Knights Templars in Scotland.

The history of the county is of little importance apart from that of the city of Edinburgh. Traces of early Celtic occupation still remain in such names as Inveresk, Almond, Leith, Dalry, Dalmauny, Dalkeith, &c.; though by far the greater proportion of the villages, hamlets, and castles have received their present designation from Saxon possessors. The termination -ton is very frequent. Within the county lie the battlefields of Boroughmuir, where the English were defeated by the earl of Murray in 1354; Pinkie, near Inveresk, where the duke of Somerset inflicted tremendous loss on the Scotch; and Rullion Green, on the eastern slopes of the Pentlands, where the Covenanters were routed by the royal troops under General Dalziel.

EDINBURGH, the ancient capital of Scotland, as situated in the county of Mid-Lothian or Edinburgh, to the south of the Firth of Forth. The Royal Observatory, which is built on the summit of the Calton Hill, in the north-eastern quarter of the city, is in 55° 57' 23" of N. lat., and 12° 43' 05" of time W. long. of the meridian of Greenwich. The site of Edinburgh is altogether remarkable as that of a large city, and is the chief source of its peculiar characteristics. It occupies a group of hills separated by deep ravines, and is the central feature of a landscape of rare beauty. The county of Mid-Lothian forms towards the south-east a wild hilly district, diversified with fertile cultivated tracts, but, over an extensive area, broken into a rough pastoral country, rising at various points to upwards of 2000 feet above the level of the sea. On the north it is bounded by the Firth of Forth, from the shores of which the ground slopes gradually towards the south till it merges in the range of the Pentland Hills, with its contour diversified by various undulations and abrupt heights. On this irregular ground, amid the outlying spurs of the Pentlands, a bold cliff of trap-rock, which rises through the sandstone strata of the district, appears to have early attracted attention from its capacity for defence. Maitland, the earliest historian of the city, says, "The situation of Edinburgh plainly shows that its origin is owing to the castle," and from its standing in St Cuthbert's parish, which surrounds the castle rock, he assumes that the first settlement was in the low ground to the north-west. From this a road ancestrally led up past the Well-House Tower, along the northern slope of the Castle Hill. By this access Queen Mary and other royal visitants rode up to the castle on various public entries, and then returned through the town, by way of the High Street and Canongate, to Holyrood. Symon of Durham, under the date 854 A.D., includes Edinburgh among the churches and towns of Northumbria within the bishopric of Lindisfarne, and this is supposed to refer to the church of St Cuthbert. But the first erection of the Magdalen fortress, or "Maiden Castle," on the summit of the rock, must have tempted the natives of the district to seek the protection of its defences. Hence at an early period a hamlet grew up along the ridge which slopes from the castle rock towards the valley at the base of Salisbury Crags, distinct from the Kirk-town of St Cuthbert. In the reign of Malcolm Canmore the Castle of Edinburgh included a royal palace. There his pious queen, Margaret, the grand-niece of Edward the Confessor, died in 1093. It continued to be a royal residence during the reigns of her three sons, and hence the first rapid growth of the upper town may be referred to the 12th century. The parish church of St Giles is believed to have been erected on its present site in the reign of Alexander I, about 1110, and the huge Norman keep of the castle, built by his younger brother, David I., continued to be known as David's Tower till its destruction in the siege of 1572. Before his accession to the Scottish throne, David I. had been earl of Huntingdon, having acquired that manor and earldom in England by his marriage with Matilda the heiress of Wallerof, earl of Northumberland. He consequently frequented the English court, and became familiar with the military and ecclesiastical architecture introduced by the Anglo-Norman kings; and soon after his accession to the Scottish throne he founded the Abbey of Holyrood, which from an early date served the Scottish court as a dwelling or guest-house. But notwithstanding the attractions of the abbey and the neighbouring chase, the royal palace continued for centuries to be within the fortress, and there both the Celtic and Stuart kings frequently resided. Edinburgh was long an exposed frontier town with a territory annexed to Malcolm II. about 1020; and even under the earlier Stuart kings it was still regarded as a border stronghold. Hence, though the village of Canongate grew up beside the abbey of David I., and Edinburgh was a place of sufficient importance to be reckoned one of the four principal burghs as a judicatory for all commercial matters, nevertheless, even so late as 1450, when it became for the first time a walled town, it did not extend beyond the upper part of the ridge which slopes eastward from the castle rock. But the mural defences of the town were an evidence of wealth and growing prosperity; and no sooner was it surrounded with protecting walls than its rapid increase led to the growth of an extensive suburb beyond their limits. The other three royal burghs associated with Edinburgh were Stirling, Roxburgh, and Berwick, and their enactments form the earliest existing collected body of the laws of Scotland. But the determination of Edinburgh as the national capital, and as the most frequent scene of parliamentary assemblies, dates from the assassination of James I., in 1437. Of the thirteen Parliaments summoned by that sovereign, only one, the last of them, was held at Edinburgh. But his assassination that same year, in the Blackfriars' monastery at Perth, led to the abrupt transfer of the
accommodation for the increasing population was secured by crowding buildings on every available spot within the protection of the walls, displacing the earlier structures by lofty piles of building within the straightened area, and projecting from them overhanging additions of timber. By those means the northern and southern slopes of the ridge along which the main street of the old town was formed were crowded with the picturesque alleys and closes which contributed so much to the peculiar aspect which the ancient city still retained when in 1808 Scott thus pictured it —

"Such dainty grandeur clothed the height,
Where the huge castle holds its state,
And all the steep slope down,
Whose ruddy back heaves to the sky,
Riled deep and many, close and high,
Mines own romantic town."

Within this ancient civic area stand the collegiate church of St Giles—for a time the cathedral of the diocese of Edinburgh,—the Parliament House and law courts, and the civic Council Chambers. Here also in earlier years of the present century stood the old Tolbooth, or Heart of Mid-Lothian, and other buildings of note, including mansions of the Scottish nobility, and even of royalty. But it forms a mere historic nucleus of the modern city, which for a century past has been extending over the neighbouring heights, northward towards the ancient sea-port of Leith, and southward and westward to the lower slopes of the Pentland Hills. The area included within the parliamentary boundary extends to 4179 acres, or 64 square miles; but, owing to its singularly irregular site, while the lower parts of the city stand little more than 100 feet above the level of the sea, the higher parts rise in some places to 250 feet, and the summit of the castle rock is 383 feet above the sea.\footnote{1} Within the same civic

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\footnote{1} The extensive building operations engaged in by the corporation at the beginning of the century were the main cause of the insolvency of the city in 1835, when the property of the corporation was valued...
area, and entirely surrounded and in part encroached on by its streets, is the Calton Hill, occupied by the Royal Astronomical Observatory, the floor of which stands at a height of 349 feet above the sea; and beyond the narrow valley, in which the Canongate and the Palace of Holyrood lie, Arthur's Seat and Salisbury Craggs rear their loftv cliffs in boldly picturesque outline, the highest summit rising to the height of 822 feet, and affording a magnificent prospect over land and sea. Bridges connect the different ridges on which the city is built, with crowded thoroughfares underneath. Many of the public buildings occupy lofty terraces, and thereby show to greater advantage than their architectural designs would otherwise secure for them. The valley between the Old and the New Town, and the slopes of the castle rock, are laid out as public gardens; and the Calton Hill and Arthur's Seat furnish promenades and carriage drives of unequalled variety and beauty as the public parks of a large city. Fine white freestone abounds in the immediate neighbourhood, and furnishes abundance of the best building material; while the hard trap-rock, with which the stratified sandstones of the coal formation have been extensively broken up and overlaid, supplies good materials for paving and roadmaking.

Thus on a locality seemingly ill-adapted for the site of a great city, there has gradually arisen one which compares to advantage with the most picturesque and beautiful among the capitals of Europe. Sir David Wilkie came to it in 1799 fresh from a Fifeshire maus, to begin the studies in the Edinburgh school of design which ultimately secured for him his high fame as an artist. When he returned to it in later years, familiar with all that European art had to disclose, he thus gave utterance to his matured impressions:—

"What the tour of Europe was necessary to see elsewhere I now find congregated in this one city. Here are all the beauties of Prague and of Salzburg, here are the romantic sites of Como and Tivoli; and here is all the magnificence of the admired bays of Genoa and Naples. Here, indeed, to the poetic fancy may be found realized the Roman Capitol and the Great Saloon of the Quirinal, the temple of Juno, the Palatine, and all the wonders of the Grecian Acropolis."...—

The name of Edinburgh is a memorial of the intrusion of a new people, when, in the beginning of the 7th century, the race of Ida reared the fortress of Edinburgh to the height of 196,979. But the narrow bounds of the ancient city and the burgh of Canongate, with the main street extending along the height of the slope from the Castle to Holyrood Palace, and the Cowgate as the only other thoroughfare admitting of the passage of wheeled carriages. Hence the vehicle in general use was the sedan chair, by means of which the Scottish nobility and gentry passed fashionable visits in the narrow wynds of their ancient capital, and proceeded in full dress to the assemblies and balls, which were conducted with the most aristocratic exclusiveness in an alley on the south side of the High Street, which still bears the name of the Assembly Close.

Beyond the walls of the ancient city lay the burghs of Edinburgh during the present century has been remarkable in many ways. In 1801 the population, including the Canongate and other extra-mural suburbs, but exclusive of Leith, was 106,544; in 1871 it had risen to 198,379. But the characteristics of the city and its population are peculiar. From an early date the special associations with the national literature have been identified with the ancient capital Edinburgh, the contemporary of Chaucer, was archdeacon of Aberdeen; and the royal author of the "King's Quair" is chiefly associated with Edinburgh, but in the following reigns Eildon Hill became the favourite residence of the Scottish kings. One of the foremost charges against James III. was that he preferred the society of artists and musicians to that of the rough barons of his court. Under the patronage of his son, the printing press was first set up at Edinburgh in 1507. At the court of Holyrood, so long as James IV. reigned, the rivalry of rank and genius involved no conflict. Of the three great poets of the reign, Dunbar is believed to have been a grandson of the earl of March; Walter Kennedy was a younger son of the first Lord Kennedy; Gawin Douglas the third son of the earl of Angus; and Dunbar enumerates six or seven other literary contemporaries. In his "Remonstrance to the King," he notes among the servitors of his royal master glaziers, wrighters, goldsmiths, lapidaries, apothecaries, painters, and printers: and some of his own poems appear to have been among the first works issued from the Edinburgh press by the Scottish Caution, Walter Chapman. Gawin Douglas, the author of the "Palace of Honour," and the translator of Virgil, was provost of the collegiate church of St Giles; and Rovell, another literary contemporary named by Dunbar in his "Lament for the Makaris," is believed to have been provost of the neighbouring collegiate church of Corstorphine. In the following reign Sir David Lindsay was the leader among the literary men of the Scottish capital; and as one of the members of the Council of the Three Estates was enacted in the presence of the court, at Greenwich, a natural amphitheatre on the north-
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West side of the Calton Hill, which appears to have been the favourite titling ground, and general arena for public displays,—including even the burning of heretics and witches.

The names of Knox (died 1572), Buchanan (1532), Alexander Montgomery (1605), Drummond of Hawthornden (1649), Allan Ramsay (1715), Smollett (1771), Ferguson (1774), and Burns (1795), carry on the literary associations of the Scottish capital nearly to the close of the 18th century, when various causes combined to give them a new significance and value. In the later years of the 18th and the beginning of the 19th century the university of Edinburgh was distinguished by teachers who gave it a prominent rank among the European schools of science and letters; while members of the legal faculty disputed with them in friendly rivalry. Gregory (died 1701), the Monroes (the elder 1767, the second 1817), Cullen (1790), Black (1799), Playfair (1819), Dugald Stewart (1828), and Leslie (1832), all figure among the professors of the university; while David Hume (1776), Adam Smith (1770), Robertson the historian (1793), Henry Mackenzie (1851), and others of the same literary circle gave ample range to its intellectual triumphs. To this succeeded the era of Marmion and The Lady of the Lake, followed by the Waverley Novels, and Blackwood's Magazine and the Edinburgh Review, when Scott, Brougham, Jeffrey, and Chalmers gave the character to the literary society of Edinburgh which won for it the name of Modern Athens. To this the actual correspondence of its site to that of Athens no doubt also contributed. Various travellers have noted the resemblance between the distant view of Athens from the Aegean sea, and that of Edinburgh from the Firth of Forth. The popular recognition of this unfortunately tempted the citizens to aim at a reproduction of the Parthenon on the summit of the Calton Hill, in commemoration of Wellington and his brothers in arms, by whom the victory of Waterloo was made the harbinger of peace to Europe. The abortive scheme, as an incompletely projected, undesignedly reproduces the ruin of the ancient Acropolis.

Literary taste and culture still characterize Edinburgh society; but—apart from the exceptional influences of eminent genius—the causes which largely contributed to give it a special character no longer exist. In Scott's early days a journey to London was beset with difficulties and even dangers; whereas railways have now brought it within a few hours' distance, and Scottish artists and literary men are tempted to forsake Edinburgh for the great centre of all national activities. Nevertheless, the influence of the past still survives in many ways. Edinburgh is not a manufacturing city, but retains even now something of the character of the Scottish capital, as the resort of those whose means enable them to enjoy in ease and comfort its social amenities, without indulging in the costly gaieties which a London season involves. The supreme courts of law hold their sittings in Edinburgh, and still retain some of the most characteristic features impressed on them when remodelled by James V. in 1532. The Court of Session has the lord president as its head; and the High Court of Justiciary is presided over by the lord justice-general and the lord justice-clerk. The judges, as senecors of the College of Justice, have also the title of lord, not infrequently coupled with that of their landed estate—as Fountainhall, Hailes, Momboddi, Woodhouses, or Colmonay; and the advocates and writers to the signet—as the two leading branches of the Scottish legal profession are styled,—help to give a legal ton to the society of the Scottish capital.

The university, with the medical schools and other educational institutions, have long added to the attractions of Edinburgh. As a school of art it has also required a special character; and the names of Runciman, Nqmyth, Raeburn, Wilkie, Allan, M'Colloch, Watson Gordon, Harvey, and Drummond (without referring to living painters and sculptors) are all familiar, and some of them eminently distinguished in art. A school of design was established at Edinburgh in 1750 by the Honourable Board of Trustees for Manufactures, at which Raeburn, Wilkie, Allan, and other leading Scottish artists, along with many others, have also obtained their preliminary training. With its aid the application of art to manufacturing design and decoration has received an important stimulus. Steel and wood engraving have also largely benefited by the same facilities; and this in its turn has aided in fostering the printing press as a special branch of trade for which Edinburgh has long been celebrated. In early days the names of Chapman, Millar, Bassandyne, Charters, Hart, Watson, and Ruddiman figure among its celebrated typographers; and more recent enterprise has added to the reputation of the Edinburgh press.

But although a large unemployed population, in close proximity to a coal-field and to the fertile Lothians, and with the command of the chief seaport of the east of Scotland, gives a stimulus to important industries, the Scottish capital lays no claim to rivalry with Glasgow or Dundee as a manufacturing town. The unique beauty of its site, and the abundance of fine building material, while they have fostered the desire for developing its architectural features have begotten a disinclination to encourage such manufactures as would tend to interfere with the amenities of the city. The anxiety with which these are guarded commands the sympathy of all classes of the community. The distinctive character of the New Town is all the more effective from the contrast which it thus presents to the older districts of the city. In most of the old historical cities of Europe the stranger recalls the contrast as he proceeds from modern to older districts; but in Edinburgh he can look down on the city from the castle, the Calton Hill, or Arthur Seat, and see on the whole spread out like a map before him; or, as he traverses the beautiful terrace of Princes Street, adorned with statues, monuments, and public buildings, he looks across the fine paler grounds in the intervening valley to the quaint old town with its still older castle.

The improvements effected on the Old Town during the past forty years, while they have swept away many unsightly irregularities of the sites occupied by ancient buildings, have also largely benefited by the same facilities. The帅metrical regularity of the New Town is kept in view. The predominant character of the former is a seemingly less picturesque features, resulting from the extreme irregularities of the sites occupied by its most prominent buildings on the abrupt slopes of the ridge which is crowned by the ancient fortress. The symmetrical regularity of the New Town is all the more effective from the contrast which it thus presents to the older districts of the city. In most of the old historical cities of Europe the stranger recalls the contrast as he proceeds from modern to older districts; but in Edinburgh he can look down on the city from the castle, the Calton Hill, or Arthur Seat, and see on the whole spread out like a map before him; or, as he traverses the beautiful terrace of Princes Street, adorned with statues, monuments, and public buildings, he looks across the fine paler grounds in the intervening valley to the quaint old town with its still older castle.

The improvements effected on the Old Town during the past forty years, while they have swept away many unsightly historical remains, have on the whole resulted in a more effective development of its picturesque features. During the same period the New Town, and the still more recent extensions to the west and south, have been carried out with a careful eye to the general result; and alike in the Old and the New Town the advantageous sites of the chief public buildings largely contribute to their architectural effect.

The Castle.—The central feature of Edinburgh is the castle, which includes structures of very diverse dates. The oldest of its buildings, occupying the very summit of the rock, is St. Margaret's Chapel, an interesting relic, belonging at latest to the reign of Queen Margaret's youngest son, David I., and by some good authority believed to be the actual chapel in which the queen of Malcolm Canmore worshipped. Next in interest are the ancient hall and other remains of the royal palace, which form a fine quadrangle styled palace yard, and occupy the summit of the rock towards the south. These buildings include the apartments occupied by the regent, Mary de Guise, and
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her royal daughter, Queen Mary, and the room in which James VI. of Scotland and I. of England was born. Here also is the Crown Room, in which are deposited the Scottish regalia, or "The Honours of Scotland," as they are called, along with a beautiful sword of state presented to James IV. by Pope-Julius II., and the jewels restored to Scotland on the death of Cardinal York, the last of the Stuarts.

The arsenal, a modern building on the west side of the castle rock, is capable of storing 30,000 stand of arms. In the armoury a display of arms of various dates is made, and on the Argyll battery, immediately to the south of St Margaret's Chapel, stands a huge piece of ancient artillery, called Mons Meg, of which repeated mention is made in Scottish history.

Holyrood Palace, the venerable abode of Scottish royalty, was originally an abbey of canons regular of the rule of St Augustine, founded by David I. in 1128. The ruined nave of the abbey church still retains portions of the original structure. Conjoined to this is a part of the royal palace erected by James IV. and V., including the apartments occupied by Queen Mary, and the scene of the murder of Rizzio in 1566. The abbey suffered in repeated English invasions. It was sacked and burned by the earl of Hertford in 1544, and again pillaged and left in ruin by the same invader in 1547, almost immediately after the accession of Edward VI. to the English throne. In a map of 1544, preserved among the Cotton MSS., in the British Museum, the present north-west tower of the palace is shown standing apart, and only joined to the abbey by a low cloister. Beyond this is an irregular group of buildings, which were replaced at a later date by additions more in accordance with a royal residence. But the whole of this later structure was destroyed by fire, while in occupation by the soldiers of Cromwell, in 1650; and the more modern parts of the present building were commenced during the Protectorate, and completed in the reign of Charles II. by Robert Mylne, in accordance with a design of Sir William Bruce of Kinross. They include the picture gallery, 150 feet in length, famous for its fanciful array of 106 mythical portraits of Scottish kings, the reputed descendents of King Fergus I., but also adorned with a remarkable triptych, painted about 1464, containing portraits of James III. and his queen, Margaret of Denmark, and believed to have formed the altar-pieces of the collegiate church of the Holy Trinity, founded by the widowed queen of James II. in 1463, and only demolished in 1848. The picture gallery is interestingly associated with festive scenes during the banquet given by Prince Charles Edward in 1745; and in it the elections of representative peers for Scotland take place. The exiled Comte d'Artois, afterwards Charles X. of France, had apartments granted for the use of himself and the emigrant nobles of his suite, on their escape from the first French Revolution, and they continued to reside in the palace till August 1799. When driven from the French throne by the revolution of 1830, the same unfortunate prince once more found a home in the ancient palace of the Stuarts. In the interval between these two visits it was graced by the presence of George IV. in 1822, and he has been repeatedly occupied for brief periods by Queen Victoria and the Prince Consort.

A beautiful fountain, the design of which is a restoration of the ruined fountain in the quadrangle of Linlithgow Palace, stands in the centre of the outer court of Holyrood, and is of the interest excited by Prince Albert in the ancient Scottish palaces.

The Parliament House, in which the last assemblies of the Scottish estates took place, until the dissolution of the Parliament by the Act of Union of 1707, has ever since been set apart as the place of meeting of the supreme courts of law. The great hall, with its fine open-timbered oaken roof, under which the last Scottish Parliament assembled still stands, and forms the ante-room of the advocates and other practitioners, and of their clients, during the sessions of the supreme courts. But the surrounding buildings, including the court-rooms, the Advocates' and the Signet Libraries, are all modern additions. The Advocates' Library is the largest and the most valuable library in Scotland. It was founded in 1682, at the instance of Sir George Mackenzie, king's advocate under Charles II., and then dean of the faculty, and has been augmented by important gifts. It is regarded with just pride as the national library, and is one of the five libraries entitled by the Copyright Act to receive a copy of every work printed in Britain. The number of volumes now included in the collection is estimated to amount to 260,000. The Library of the Society of Writers to the Signet contains upwards of 50,000 volumes, and, although more private in its character, it has always been available for research by literary students.

The General Register House for Scotland, which stands at the east end of Princes Street, is an important adjunct to the supreme courts; and, in its ample provisions for the registry and safe-keeping of all deeds and judicial records, it compares favourably with the system in vogue in England. Not only is there adequate accommodation, in fire-proof chambers, for all Scottish title-deeds, entail, contracts, and mortgages, and for general statistics, including births, deaths, and marriages, but there also are deposited all the ancient national records, the full historical value of which is only now beginning to be generally appreciated.

The Royal Institution, a fine structure of the Grecian Doric order, surmounted by a colossal statue of the Queen, executed in stone by Sir John Steell, furnishes official accommodation for the Board of Trustees for Manufactures, and the Board of Fishery, and also for the School of Art and Status Gallery of the Royal Institution, the Museum of National Antiquities, and the libraries and public meetings of the Royal Society and the Society of Antiquaries of Scotland. This handsome building is the centre of varied intellectual activity, in artistic culture and design, scientific, historical, and archaeological research, as well as in the practical application of the fine arts, and of the newest disclosures in science, to the manufacturing and trading interests of the kingdom.

Among those the National Museum of Antiquities claims special attention. The Society of Antiquaries of Scotland was founded in the year 1780 by a body of noblemen and gentlemen, who held their first meetings at the house of the earl of Buchan; and almost immediately after its foundation they devoted themselves to the formation of an Archæological Museum. The history of the early years of the society is a curious commentary on the manners of the Scottish capital a century ago. With the duces of Montrose and Argyle, the earls of Buchan, Bute, Fife, and Kintore, and many of the leading Scottish gentry among its active members, a suitable hall secured for the meetings of the society in the Cowgate was successively exchanged for others in Webster's Close, and Gourlay's Close, Lawnmarket—the reason assigned for abandoning the latter being that the alley was too narrow to allow of the members reaching the society's hall in their sedan chairs. After passing through various vicissitudes, and occupying more than one hall in the New Town, it was found that the collections of the society had attained to a magnitude and value which rendered it no longer possible for a private society to do justice to them. Archæological investigations,
moreover, have now come to occupy a no less important relation to the researches of science than to the study of history; and in many of the capitals of Europe similar collections are promoted as objects of national importance. Negotiations were accordingly entered into with the Government in 1849 and subsequent years, which resulted in the appropriation of the galleries in the Royal Institution, formerly devoted to the exhibitions of the Royal Scottish Academy, to the reception of the collections of the Society of Antiquaries of Scotland as a National Museum of Antiquities. The council of the society, with the addition of two members of the Board of Trustees as representatives of the Crown, continue to have the charge of the collections, which are open to the public, like the British museum and other national collections. The museum is specially rich in Scottish antiquities, illustrative alike of prehistoric archæology, of Roman, Celtic, and Teutonic remains, and of medieval civil and ecclesiastical art; and its native and foreign collections of primitive antiquities are arranged with a view to illustrate modern archæological science, by the comparative classification of numerous examples of primitive flint, stone, and bronze relics, sepulchral pottery, implements and weapons, and of personal ornaments of gold, silver, and bronze. The society publishes its proceedings annually, and from time to time issues its transactions, embodying the more important historical and archæological treatises submitted to its meetings, in the quarto volumes of the Archæologia Scotia.

The Royal Society of Edinburgh was incorporated by royal charter in 1783, for the encouragement of philosophical inquiry and scientific research. Its extensive library and other collections are accommodated in the apartments occupied by it in the Royal Institution buildings; and its proceedings and transactions are now voluminous, and embody many important scientific papers.

The Royal Scottish Academy of Painting, Sculpture, and Architecture, was instituted in 1826, and incorporated by royal charter in 1838, on the model of the Royal Academy of London. Subsequent to the completion of the Royal Institution buildings, the central range of the galleries was appropriated to the annual exhibitions of the Academy; but in August 1850 Prince Albert laid the foundation-stone of the National Gallery, a building exclusively devoted to the promotion of the fine arts in various ways, including the accommodation of the Royal Scottish Academy, and which has greatly contributed to the architectural beauty of the city. The low valley, or ravine, which separates the Old from the New Town, is not only spanned by the North and Waverley Bridges, but is also crossed midway by a huge earthen viaduct, formed by depositing the materials excavated for the foundation of the houses erected on the neighbouring terraces of Princess Street. This, which long formed an unsightly blemish, was at length utilized for the improvement of the city, as the site of the National Institution building. But there still remained in the rear a huge expanse styled the Earthen Mound, cumbered with temporary buildings, and an eyesore to all who appreciated the amenities of the general view. The property of this as a building site was acquired by the Board of Trustees under an Act of Parliament, which vested it, and the buildings erected thereon, in the Board, subject to the Lords Commissioners of the Treasury; and in 1854 the new galleries were completed. The building is of the Greek Doric order, thereby pleasantly contrasting with the more massive Doric of the Royal Institution building; and the view of the two, as seen from East Princes Street, grouping together with the Castle, the Free Church College, and the masses of the Old Town buildings rising behind, is singularly striking and effective. The National Gallery provides for the public display of a fine national collection of paintings and sculpture, acquired by purchase and bequest, for the annual exhibitions of the Royal Scottish Academy, and for the Life Academy and other schools specially designed for the advancement of the fine arts in Scotland.

The University of Edinburgh was founded in 1582, by a royal charter granted by King James VI., and its rights, immunities, and privileges have been remodelled, ratified, and extended at various subsequent periods. In 1621 an Act of the Scottish Parliament ratified to the university of Edinburgh all rights and privileges enjoyed by other universities in the kingdom, and those were renewed under fresh guarantees in the Treaty of Union between England and Scotland, and in the Act of Security. Important changes have since been made on the constitution of the university by an Act of the British Parliament passed in 1858. But while the college, as such, bears the name of the College of King James, or King's College, and James VI. is spoken of as its founder, it originated in the liberality of the citizens of Edinburgh. William Little of Craigmullar, and his brother Clement Little, advocate, along with James Lawson, the colleague and successor of Knox, may justly be regarded as the true founders of the college. In 1580 Clement Little gave all his books, amounting to 300 volumes, for the beginning of a library, and this was augmented by other valuable benefactions, one of the most interesting of which was the library of Drummond of Hawthornden, the friend of Ben Jonson—a collection rich in choice specimens of our rarer early literature. The University Library now contains about 139,000 printed volumes, and above 700 volumes of MSS., many of which are of great interest and value.

The buildings of the university occupy the site of the ancient collegiate church of St Mary in the Field, or the Kirk of Field, as it was familiarly termed. The present structure is a classical building, inclosing an extensive quadrangle. The older parts of it, including the east front, are from the design of Mr Robert Adam; but his plans were revised and modified with great taste by Mr W. H. Playfair, with a view to the completion of the building; and the whole is now finished, with the exception of a cupola designed to surmount the east front, for which the requisite funds have been bequeathed to the university. The edifice affords accommodation for the lecture rooms in the four faculties of arts, law, medicine, and theology, and for the museums and library. But although entirely reconstructed on a greatly enlarged scale during the present century, they have already proved to be inadequate for the requirements of this celebrated school of science and letters; and extensive new buildings are now in progress at Tavistock Row, designed to accommodate the departments of science and medicine, and to leave the older building exclusively for the departments of arts, law, and theology. The new buildings will accordingly include a university convocation hall, class-rooms, laboratories, dissecting rooms, and museums.

In connection with this, the Royal Infirmary is also in progress of completion, on a new site, and on a greatly enlarged scale, with operating theatre and other requirements in connection with the medical school, and with all the most modern improvements in the arrangement and construction of hospitals. For this a site nearly adjoining to that of the new college buildings, previously occupied by George Watson's Hospital, has been selected. It embraces a large area between the Heriot's Hospital grounds and the Meadows, and separated by the fine avenue of the Meadow Walk from the new medical schools. By this means the important requisites of free air and the immediate vicinity of extensive pleasure grounds are secured; and thus the primary object of the infirmary as a benevolent institution for ministering to the wants of those afflicted with disease,
or suffering from injuries, is efficiently combined with its indispensable uses as a school for clinical instruction and practical training in the healing art.

The Royal Botanical Garden is another important adjunct to the university as a school of science. The professor of botany is regius keeper of the garden; but its special requirements necessitate its removal from the crowded centre of the city. It has accordingly undergone four successive changes of site since its foundation in 1670 by Sir Andrew Balfour and Sir Robert Subbald. It now occupies a fine area of 27 acres on the north side of the city, in Inverleith Row. This is carefully laid out with a special view to botanical instruction. It includes a herbarium and palm houses, with an extensive range of botanic gardens, a museum of economic botany, a lecture room, and other requisites for the students of botany who attend here the lectures of the professor during the summer term.

The Royal Observatory, which has already been referred to as one of the arts of the Calton Hill, also constitutes an important adjunct to the university. The astronomer royal for Scotland holds along with that office the professorship of practical astronomy.

Museum of Science and Art.—One other important institution of practical instruction, in intimate connection with the university, is the Museum of Science and Art, situated immediately to the west of the university building, and in direct communication with it. The first keeper of the museum, Dr George Wilson, was also professor of technology in the university, but the chair has not been filled since his death, though his successor in the charge of the museum delivers lectures from time to time in the large lecture room in the east wing of the building, which is capable of accommodating about 800 sitters. The Museum of Science and Art embraces not only the objects of science included in the departments of geology, mineralogy, paleontology, and natural history, as well as other allied sciences, but also of industrial art, and of the raw productions of commerce, illustrative of nearly all the chief manufactures of Great Britain, and of many foreign countries.

Royal College of Surgeons.—The museum and lecture rooms of the Royal College of Surgeons are accommodated in a handsome classical building in Nicolson Street, in the immediate vicinity of the university buildings. The College of Surgeons is an ancient corporate body, with a charter of the year 1552, and exerts the powers of instructing in surgery and of giving degrees. It also give lectures on the various branches of medicine and science requisite for the degree of doctor of medicine, and those extra-academical courses are recognized, under certain restrictions, by the university court, as qualifying for the degree. The museum contains a valuable collection of anatomical and surgical preparations adapted to the advancement of the study of surgical science.

Royal College of Physicians.—The Royal College of Physicians is another learned corporate body, organized as such, with special privileges by a charter of incorporation granted to them by Charles II. in 1651. The meetings of the body take place in the hall, a handsome building on the terrace overlooking the Queen Street Gardens, where they have a valuable library and a museum of materia medica. But the college as a body takes no part in the educational work of the university.

The three older Scottish universities of St Andrews, Glasgow, and Aberdeen, founded in the 15th century, by the authority of papal bulls, and derived their original endowments chiefly from the liberality of munificent ecclesiastics, who had large revenues and church property at their disposal. They represent a part of the grand conception of the 15th century, which aimed at organizing the learning of the age into local branches of one university system, embracing the whole scholarship of Christendom, and recognizing the graduates of all universities as members of one corporate brotherhood, co-extensive with the Christian world. The Scottish university system still differ from those of Oxford and Cambridge in perpetuating some curious relics of this combined national university system.

The first conception of the University of Edinburgh is also due to a learned Scottish ecclesiastic, Robert Kirk, bishop of Orkney, a favourite councillor of James V, who died at Dunger-Arms in 1548, as it is believed from poison, when on his way home, after fulfilling his duties as one of the commissioners of Scotland to the Dauphin of France. He left a bequest of 8000 marks towards the founding of a college at Edinburgh, and is stated by the historian of the family of Sutherland to have directed a much larger sum for the same purpose, but it was diverted by the Earl of Morton to his own use. The above-named bequest was only recovered after long delay, when, in 1581, it was appropriated to the purchase, from the provost of the Kirk of Field, of the grounds now occupied by the university buildings. The circumstances attendant on the death of this first benefactor of the University remind us of the ecclesiastical changes already in progress in the 16th century. The actual foundation of the University of Edinburgh dated subsequent to the Reformation, and it is honourably distinguished among the national universities of Great Britain as the vestiges of the Christian Church.
Institution, of which Mr Thomas Carlyle is president. The lending library of this institution is extensive and valuable, and its annual winter courses of lectures are of a high character, and command great popular interest. The Edinburgh Literary Institute, formed on a nearly similar basis, has its building in South Clerk Street, in the southern part of the city.

Schools.—The public seminaries of Edinburgh, including the private schools and other charitable foundations chiefly directed to the training and education of youth, are upon a very liberal scale. The High School of the burgh dates its existence from an early period in the 16th century. The Burgh Record, under date March 12, 1554, contains an order for the building of the grammar school on the east side of the Kirk of Field Wynd. At a later date, and down to the present century, it occupied the site of the Blackfriars' monastery founded by Alexander II. in 1230. But in the year 1825 the foundation stone was laid of the beautiful classical building which now occupies a prominent site on the southern slope of the Calton Hill. It was originally, and till a comparatively recent date, a purely classical school, but it now furnishes systematic instruction in all the departments of a liberal and commercial education, including the ancient and modern languages, the natural sciences, mathematics, &c.

The Edinburgh Academy, which was established in 1824, and incorporated by royal charter of George IV., is a proprietary school under the superintendence of a board of directors elected by the subscribers. It is arranged into two divisions, the classical and the modern school, for the senior classes. It has established a high character for its classical training, and has already taken an honourable rank among the public schools of Great Britain, by the distinctions achieved by its pupils both at the English and Scottish universities.

Charitable Foundations.—Foremost among the charitable foundations for the education and training of youth is George Heriot's Hospital, founded by the jeweller of James VI. of Scotland and I. of England, who at his death in 1624 left his estate in trust to the magistrates and ministers of Edinburgh for the maintenance and education of poor fatherless boys of freemen of the city. The building erected for the purposes of the charity is a noble quadrangular edifice, enriched with the elaborate details of the transitional style of domestic architecture of the earlier Stuart kings of England. It occupies a commanding site on the summit of a ridge known of old as the High Riggs, lying between the Grassmarket and the Meadows, and forms a striking feature in the view of the city from various points. 180 boys are maintained on the foundation, 120 resident, and 60 non-resident. Those among them who give proof of diligence and ability are afterwards maintained during a full course of four years at the university; and those who are apponticed to trades are also provided with funds for five years, amounting in all to £50 sterling, with an additional £5 on proof of good behaviour at the close.

The popular character of Heriot's Hospital, and the effective architecture of its building, have largely influenced the disposition of later charitable bequests in Edinburgh, somewhat to the detriment of the university. Following the example of the jeweller of King James VI., successive benefactors have founded George Watson's Hospital, the Merchant Maiden Hospital, the Trades' Maiden Hospital, the Orphans', John Watson's, Donaldson's, and Stewart's hospitals—all more or less modelled on the original foundation.

Several of their buildings are possessed of considerable architectural beauty, foremost among which is Donaldson's Hospital, the founder of which amassed a large fortune as a printer, and bequeathed nearly the whole of it in trust for the erection and endowment of a hospital for the maintenance of poor boys and girls. The trustees have taken advantage of the liberty of choice permissible under the will of the founder to choose half of the children admitted to the hospital from the class of the deaf and dumb. The building has accommodation for 300 children. In 1877 it contained 214, of whom 120 were boys and 94 girls. Of those 70 of the former and 45 of the latter were deaf and dumb. Experience has thus far tended to show that the constant intercourse between the deaf and dumb and their more fortunate companions exercises a beneficial influence on both.

George Watson's Hospital, founded by the bequest of another citizen in 1733, and the Merchant Maiden Hospital, founded so early as 1605, were designed to extend to the sons and daughters of merchants of Edinburgh similar advantages to those which the Heriot's Hospital secured for its pupils. The Trades Maiden Hospital provided for burgers' daughters, and John Watson's, Daniel Stewart's, and other similar institutions provided in like manner for the maintenance and education of poor children of various classes. But the multiplication of such charities threatened to outgrow the legitimate wants of the community, and needlessly to withdraw many children from the healthful influences of home training. Hence a growing feeling of the abuses of the system, at the very time when the revenues of Heriot's Hospital were greatly increased in consequence of the site being transferred to the New Town over its lands, at length led to an application to Parliament for power to modify the disposition of the surplus revenue by the Act thus obtained the governors of that institution were empowered to expend such surplus funds in erecting and maintaining elementary schools for the free education of poor children of deceased burgesses and freemen, and general of the children of poor citizens of Edinburgh. There are now eighteen of those Heriot foundation schools, in different parts of the city, divided into the two classes of juveniles and infant schools, giving free instruction for five years, and, in certain cases of extreme poverty, also a sum of money in lieu of maintenance, to 4490 boys and girls.

The example thus set has been followed by the governing bodies of other similar institutions. The Merchant Company, as trustees of the George Watson's, Merchant Maiden, Gillette's, and Stewart's charities, taking advantage of powers given by the Endowed Institutions (Scotland) Act, obtained power to convert the George Watson's Hospital into a school; and since then, they have sold the building and grounds to the corporation of the Royal Infirmary, and the New Infirmary is now in progress on the site. The Edinburgh Merchant Company's Schools now include the George Watson's College-Schools, in which ample provision is made for furnishing a liberal education for boys, qualifying them for commercial or professional life, for the civil service, and for entering the university. Bursaries are also offered for competition, which secure a free enjoyment of the entire course of studies to the successful competitors, and furnish the sum of £25 annually, for four years, after leaving the schools. A similar institution provides corresponding advantages for girls; and the Edinburgh Educational Institution, or Ladies' College, in like manner furnishes a high-class education in the ancient and modern languages, mathematics, the natural sciences, music, and other more strictly feminine accomplishments; and bursaries and other prizes, of like value to those offered for competition in the College Schools, are placed within reach of the ablest and most diligent female students.

Experience has, therefore, amply confirmed the wisdom of the course thus pursued in the readaptation of this class of charities to the wants of the age; and the example of Edinburgh is likely to influence other cities where similar endowments are, in some cases at least, very partially turned to useful account.

Edinburgh is otherwise well provided with both public and private schools, to which pupils resort, not only from many parts of the kingdom, but from the colonies. The Fettes College was apparently designed by the terms of the will of its founder, Sir William Fettes, to correspond nearly to Heriot's Hospital. The trustees have so far fulfilled that idea as to establish a college for boys after the great public schools of England, and designed to furnish a liberal education in the fullest sense of the term. The college building which has been erected at Comely Bank, the estate of the founder, on the north side of Edinburgh, is a structure of an imposing and stately character in the semi-Gothic style of architecture prevalent both in France and Scotland in the 16th century.

The Church of Scotland Training College, the Free Church Normal School, Merchiston Academy, occupying
the antique tower of Napier, famous as the inventor of the logarithms, and the Watt Institution and School of Arts, all merit notice among the more important educational institutions; and under the Edinburgh School Board efficient schools are now in operation in various districts of the city, mostly lying beyond the range of the Herold's schools.

Charities.—Among the public charities of the city the Trinity Hospital, no longer maintained as a hospital with resident pensioners, now expends its income in pensions of from £10 to £20, to 172 poor burgesses, their wives, or children, not under the age of fifty years. The benevolent branch of the Gillespie's Hospital endowment is similarly administered. The Chalmers' Hospital, founded by George Chalmers in 1836, destined for the reception of the sick and burt, stands on the southern slope of Lauriston, overlooking the Meadows, and at no great distance from the New Royal Infirmary, to which it is a useful adjunct. In addition to these, it may suffice to name the Convalescent House—where, in a pleasant country home near Corstorphine, the convalescents of the Infirmary are transferred from the surgical or fever wards of that hospital to healthful fresh air,—the Royal Hospital for Sick Children, the Home for Crippled Children, the Hospital for Incurables, the Royal Maternity Hospital, along with other kindred institutions. The Royal Asylum for the Insane is at Morningside, on the southern outskirts of the city; and the Royal Blind Asylum, and the Deaf and Dumb Benevolent Society, each provide for the special classes indicated by their names.

Prisons.—The different city prisons are grouped together on the southern terrace of the Calton Hill, styled of old the Dow Craig, so as to form a very striking feature in the general view of the city from various points. They are constructed in a semi-castellated style; and the house of the governor of the jail, built on the summit of a rock overlooking the whole, and on the very edge of a bold perpendicular cliff, looks not unlike one of the old castles familiar to the voyager on the Rhine.

The General Post-Office is the central office for Scotland, alike for postal and telegraphic service, and the building devoted to those purposes is a large and effective structure in the Italian style of architecture, at the east end of Princes Street, directly opposite to the Register Office.

General Assembly of the Church of Scotland.—During the establishment of Episcopacy in Scotland, Edinburgh was the seat of a bishop, and the ancient collegiate church of St Giles rose to the dignity of a cathedral. The annual meeting of the General Assembly of the Church of Scotland at Edinburgh is now the grand public manifestation of the predominance of Presbyterianism as the national church. Annually in the month of May a nobleman, commissioned to act as the representative of the Queen, takes up his abode at the Palace of Holyrood, and proceeds from thence in state to the High Church, and thence to the Assembly Hall on the Castle Hill, as the lord high commissioner to the General Assembly of the national church. The lord provost and magistrates resolutely offer to him the keys of the city. Leves, receptions, and state dinners revive in some degree the ancient glories of Holyrood; and, as the General Assembly of the Free Church and the Synod of the United Presbyterian Church are usually held at the same time, the streets of Edinburgh present a singular aspect to a stranger.

Places of Worship.—The buildings set apart as places of worship by the various denominations include 30 belonging to the Church of Scotland, 29 to the Free Church, 23 to the United Presbyterian Church, 14 to the Episcopal Church, and about 30 others to different religious denominations, including a Jewish synagogue.

St Giles's Church.—Among the buildings dedicated to the worship of the different denominations, the ancient collegiate church of St Giles is the most important, alike in its architecture and its historical associations. The Regent Murray, the marquis of Montrose, and Napier of Merchiston are distinguished among the eminent men interred in the ancient church, by monuments marking their tombs. The choir, which has recently been cleared of encumbering galleries, and tastefully fitted up with oaken stalls, and a fine carved pulpit of Caen-stone, is a beautiful example of the ecclesiastical architecture of the 15th century, and the fine Gothic crown which surmounts the central tower forms one of the most characteristic features in every view of the city. The domes, towers, and spires of the various churches add to the general effect of the city, and in some cases they even present an imposing aspect from their elevated and commanding sites. But none of them is of sufficient importance to invite notice for any special architectural beauty, though several are works of merit. By the bequest of Miss Walker of Coates and Drumbeagh, who died in 1871, funds have been set apart for the erection of a cathedral for the use of the Scottish Episcopal Church. The plans have been prepared by Sir G. Gilbert Scott, in the Early Pointed style of the 14th century, and include a nave, choir, transepts, and chapter-house. If completed according to the approved design, it will be the largest and finest church erected in Scotland, if not in Britain, since the Reformation.

Monuments.—The monuments and statues which adorn the city are of a peculiar character, and contribute to the singular aspect which Edinburgh presents to the eye of a stranger. The fame of Sir George Mackenzie, David Hume, Dugald Stewart, Playfair, Burns, and Scott is commemorated in the case of each by an effective monumental structure dedicated to his memory. Of these the most remarkable is the monument erected by public subscription in memory of Sir Walter Scott, which stands in the eastern division of the Princes Street Gardens. The design, which was furnished by a young architect, Mr W. Kemp, is that of a spiral Gothic cross, of great elegance both in outline and in details. A marble statue of Scott, by Sir John Steell, is placed under the central canopy; and the principal figures of two of Scott's novels in his own handwriting. The Nelson monument, a lofty castellated turret which crowns the highest cliff of the Calton Hill, though of questionable architectural taste, is a striking feature in the general view of the city; and the Melville monument, a graceful and well-proportioned column 136 feet in height, surmounted by a colossal statue of Viscount Melville, first lord of the admiralty under Pitt, rises from the centre of St Andrew Square, and terminates the eastern vista of George Street, with a reproduction, in its proportions and general outline, of the celebrated Trajan column at Rome. Distant half a mile from this, at the west end of George Street, Charlotte Square furnishes a corresponding site for the monument of Prince Albert, from the design of Sir John Steell. A central pedestal, which sustains the equestrian statue of the Prince Consort, has at each of the four angles at its base a group of figures representing different classes of the community paying honour to him; and bas-reliefs, executed, like the statues, in bronze, illustrate characteristic incidents in the Prince's career. George Street is further adorned at the intersection of two of the intermediate streets between St Andrew and Charlotte Squares, with colossal bronze statues by Chandrey of George IV. and Pitt. The beautiful garden terrace of Princes Street, on which the Scott monuments stand, also affords appropriate sites for the statues of Allan Ramsay, John Wilson, and other distinguished Scotchmen; at other prominent points in...
the Old and New Towns are equestrian statues of Charles II., the duke of Wellington, and John, fourth earl of Hopetoun; and also statues of the duke of York, George Melville, etc. The monument to the poet Burns, erected on a prominent site on the southern terrace of the Calton Hill, is in the style of a Greek peripteral temple inclosing a cella designed to form the shrine of a fine marble statue of the poet executed by Flaxman. But it proved to be too confined to afford a satisfactory view of the statue. This has accordingly been replaced by a bust from the chisel of Brodie; and the statue, after being placed for a time in the university library, now forms a prominent feature among the works of sculpture in the National Gallery.

Manufactures.—The principal manufactures may be classed under the following respective heads:—(1) Printing, lithographing, engraving, bookbinding, and type-founding; (2) brewing, distilling, coopering, and manufacture of aerated waters; (3) furniture work, paper-hanging, and coach-building; (4) indigo-rubber work; (5) machinery and brassfounding; (6) tanning; (7) glass work; (8) confec tionery.

The city is supplied with water from various extensive reservoirs formed in the valleys of the Logan Water, the Bavelaw Burn, and the North Esk, in the Pentland Hills, lying to the south of the city. A bold project was started in 1872 for securing an inexhaustible supply by bringing in the water from St Mary's Loch, a beautiful lake about three miles in length, at the head of the Vale of the Yarrow, in Selkirkshire; but the plan met with considerable opposition, and was abandoned for a less comprehensive measure, sanctioned by Parliament in 1874, whereby additional reservoirs have been constructed in the neighbouring valleys, and an adequate supply of water secured for the growing requirements of the city.

The population of the parliamentary borough of Edinburgh amounted in 1851 to 136,294, in 1851 to 160,992, and in 1871 to 196,979 (89,245 males and 107,734 females). In 1877 the population was estimated at 218,729; and the annual value of real property was £1,533,738. The city returns 2 members to parliament, and its corporation consists of a lord provost, 6 bailies, a convener of the trades, a dean of guild, and 32 councillors.

References may be made to W. Marland's History of Edinburgh (1753), Arnot's History of Edinburgh (1789), R. Chamberlain's Traditions of Edinburgh (1834), and D. Wilson's Memorials of Edinburgh in the Olden Time (1846-49).

EDMUND, Sr (c. 1190-1240). Edmund Rich, archbishop of Canterbury, was about the close of the 12th century, at Abingdon, then the seat of a great Benedictine convent. He was one of six children. His father was a rich trader and man of the world, his mother a pious woman, who carried out remorselessly the ascetic conscience of a religious life. She fasted much and slept little, wore a hair chemise and iron stays, and made her household so uncomfortable by her arrangements that her husband, with her consent, retired to a monastery at Eynesham, as likely to be a more enjoyable home. The story of Edmund's birth and early years is strewn with marvel and miracle. Trained by his mother, he caught her ascetic spirit, and became a willing imitator of her self-mortifying ways. At the age of twelve he was sent to a school at Oxford, where he studied diligently, but continued his ascetic exercises. Naturally susceptible in a high degree to the charm of beauty, he nevertheless vowed a vow of celibacy, and espoused himself to the Blessed Virgin Mary. At Oxford he was prostrated by a high fever, so low indeed that she attended him, and by her deherv received the clerical tonsure. Shortly after, his father apparently being dead, he was sent to Paris to study at the university. He was called home to attend his mother on her death-bed; and during the next twelve months he lived in retirement in the convenant of Merion, in Cork. He then returned to Oxford, and at once took an honourable place among the teachers of the university, which he retained for some years. He is distinguished as one of the scholars who introduced the study of Aristotle; and he heartily co-operated with those who were striving to recover for Oxford the popular and prosperity as a place of study which it had recently lost, in consequence of a disturbance (1209) between town and gown, and the migration of students and masters in very large numbers. Edmund ultimately resolved to devote himself to theology, was ordained priest, and took his degree in divinity. "He is the first of our archbishops," says Dean Hook, "to whose name we find the title of S.T.P. attached—the first doctor of divinity." About 1222 he was appointed treasurer of Salisbury Cathedral, and in this office, which he held about eleven years, and to which the prebend of Calne was attached, he endeared himself alike to rich and poor. In 1227 Dr Edmund was one of the preachers of the sixth crusade. In 1233 he was elected to the vacant primacy. Three elections had previously been made by the chapter, which the Pope for various reasons had refused to confirm; and this, the fourth, was made by the Pope's suggestion, as a compromise acceptable to "Pope, king, and monks," says Fuller, "three cords seldom twisted in the same cable." The pallium was sent to England without waiting for the decision of the chapter. The position of the primacy was at that time one of peculiar difficulty, and it was with unfeigned reluctance that Edmund accepted it,—feeling, says Langard, "that the timidity of his conscience would not suffer him to acquiesce in the disorders of the age, and that the gentleness of his temper did not fit him for the stern office of a reformer." The new archbishop attached himself and steadfastly adhered to the national party, whose great object was to insure the independence of the kingdom, the maintenance of the Great Charter, and the exclusion of foreigners from civil and ecclesiastical offices. Early in 1234, before his consecration, he convened a council at Westminster, by which a remonstrance was addressed to the king, requiring him, on pain of the censures of the church, to dismiss his foreign councillors, especially Peter des Roches, bishop of Winchester, through whose influence the strongholds of the kingdom were then in the hands of foreign mercenaries. The consecration of the archbishop was celebrated at Canterbury on the 2d April 1234, and the king was present with all his court. One week later the primiate held a second council, and was commissioned by it to threaten the king with excommunication if he did not comply with the terms of the former council. This measure was effectual. The archbishop was then sent into Wales to negotiate a peace with the Prince Llewelyn. In May he held a council at Gloucester, and here was accomplished a temporary reconciliation between the king and the people. In January 1236 the primiate had the costly privilege of a royal visit, Henry III. going to Canterbury to await the coming of his bride-elect, Eleanor of Provence; and on the 14th the marriage ceremony was performed by the archbishop. A few days later he officiated at the coronation of the queen. But the hopeless divergence of aims between the king and the archbishop, and the inflexible courage and decision of the latter, induced Henry to apply secretly to the Pope, Gregory IX., to send a legate to reside in England, whose authority might nullify that of the archbishop. Meanwhile, the latter issued, in 1236, his constitutions, which are of no little interest, as an expression of the strongholds they furnish of the state of the church and of general society. The picture is not a flattering one. In 1237 arrived the legate, Cardinal Otho, who at once won
his way into the royal favour. In November he held a council at St Paul's, but failed to carry his main points against the opposition of the clergy. He stood high, however, with the king, and used or abused his prerogatives for effecting his own purposes. Archbishop Edmund now found himself in opposition to both the king and the Pope; and his position was rendered still more difficult by his excommunication of Simon de Montfort and his bride Eleanor, sister of the king, whose marriage having taken a violent and perpetual widowedness he felt bound to condemn. In 1238, with a view to obtaining the support of the Pope for his project of monastic reform, Edmund went to Rome. But in this mission he failed. Not only was his purpose frustrated, but he was treated with marked insult by the Pope; and he returned to England sad at heart and burdened with pecuniary difficulties. He soon found that he was reduced to a cipher; he saw the Papal exactions continually growing—"vexed," says Fuller, "at the poll and pealing of the English people"—and saw that the legate's great object was to crush him. In 1240, therefore, he left England, and took up his abode at the abbey of Pontigny, in a town, where Thomas Becket and Stephen Langton had previously found an asylum. At his landing he was met by the queen of France, who brought her sons, among them (St) Louis, to receive his blessing. His health was now broken down, and he sighed out the remainder of his life "in quest retirement, broken only by occasional preaching. Becoming weaker and weaker, he removed, for the sake of a better climate, to the priory of Sossay, and there he died, November 16, 1240. His tomb, within a year, began to be famous for miracles, and in 1246, after much resistance on the part of the Pope, the archbishop, the staunch foe of papal extortion, was canonized. He left a work entitled Speculum Ecclesiae, which he appears to have completed at Pontigny.

Two contemporary biographies of St Edmund are extant, one by his brother Robert Rich, the other by Bertrand, prior of Pontigny, the usual edition of musculous and incredible details being found in their accounts (W L R C.).

EDMUND, or EDMUND II. (893–1016), son of Ethelred, and the last of the line of West Saxons, was, called on account of his boldness and great strength Ironside, was, on the death of Ethelred the Unready, in April 1016, proclaimed king by the citizens of London and such of the Witan as were in the city. At that time Canute the Dane was preparing an expedition against London, and he was proclaimed king by the Witan of England, which met at Southampton. In command of a magnificent fleet he anchored before London, and by cutting a ditch round that part of the city not washed by the Thames, completely surrounded it; but the citizens, fighting with great valour, repulsed all his attacks. Meanwhile Edmund was acknowledged by the West Saxons, who flockcd from every quarter to his standard; and determining to make a diversion in favour of London, he met and defeated the enemy at Ten, near Gillingham, in Dorsetshire. Canute was forced to raise the siege of London, and encountering Edmund at Seekorston, in Wilt, would have been signally defeated, had not the trustor caldeman Edric raised the head of a fallen thane which resembled that of the king, and called to the Saxons to flee, for their king was dead. Edmund, who was on the top of a hill, saved his subjects from flight by taking off his vassar and showing his countenance, but from the disorder into which they had been thrown by the untoward incident they were unable to follow up their victory. Canute retained possession of the field of battle, but the Saxons returned, and resumed the siege of London. Afterwards the Danes were defeated at Brentford on the Thames, and at Otford in Kent, and fled to the Isle of Sheppey; but being recruited, they met Edmund at Assandun (Ashdown, in Essex), where a battle was fought which virtually decided the fate of the West Saxon kings. Through a second act of treachery on the part of Edric, who fled at the decisive moment of the battle, with the portion of the army that he commanded, the Saxons were signally defeated, and their chief nobles left dead on the field. Edmund, unsanctioned by his great losses, washed still to continue the struggle, but Edric and the Witan persuaded him to be reconciled to Canute, and to consent to a division of the kingdom. Edmund retained London and all England south of the Thames, together with East Anglia and Essex, Canute taking possession of the other and larger portion. Edmund died on the 30th November of the same year, some affirm by the hand of Edric. He was buried in the great minster of Glastonbury, and on his death Canute became sole king of England.

EDMUND, or EDMUND I (Atheling), (922–946), king of the Mercians and West Saxons, was the son of Edward the Elder, and succeeded his brother Athelstan in 911, being then, it is said, only eighteen years of age, but having already gained the esteem of the people by his courage shown three years before at the battle of Brunanburh. When he succeeded his famous brother, the Northumbrians, judging the opportunity favourable, brought over Anlaf from Ireland, and set him up as their king. The Danes of the kingdom joined them, and the result of the campaign was that Edmund was compelled to make a treaty, by which he ceded a large portion of his territory to his enemy. Two years afterwards, however, on the death of Anlaf, he not only freed his kingdom, but also subdued the Britons of Cumbria or Cumberland, and bestowed their lands on Malcolm I. of Scotland, on condition of his co-operating with him in military service. On the 26th May 946 an outlaw named Leof had shipped into the banqueting-hall of Edmund, who was celebrating the festival of St Augustine at Pucklechurch in Gloucester, and the king in sudden anger, or because he suspected his designs, endeavoured to remove him, whereupon the outlaw plunged a dagger into his bosom and killed him.
various parts of his life afford subjects of controversy rather than of precise information. The place and even the country in which he was born is the first subject of dispute. A Nubian and an Egyptian origin have both been assigned to him on the basis of a doubtful reading in his work, which speaks of "the Nile of Egypt which cuts our land." In 1663 Bochart stated that he had found in a manuscript of Leo Africanus at Leyden a copy of the kids of Edrisi was born at Septa, or Cesma, on the coast of Morocco, in 493 A.D. (1099 A.D.). Caiari not only qualifies his statement, but he does not mention the authorities from which it is derived; so that its acceptance rests only upon the confidence reposed in his learning and accuracy. Edrisi was long a mighty monarch of the whole world, as far as it was known to the Islands, in the north-eastern extremity of Asia. The inconveniences of the arrangement are obvious; but the author appears to have written an illustrative treatise to accompany an actual representation of the world which he had engraved on a silver disk or possibly a silver globe.

Two valuable manuscripts of Edrisi exist in the Bibliotheque Nationale at Paris, and other two in the Bodleian Library. The first of the English MSS., which was brought over from Egypt by Creuses, is written in the Arabic character peculiar to Northern Africa. It is illustrated by a map of the known world, and by 83 other maps, containing each part of a climate, so that there are maps only for the first three climates. The second manuscript, brought by Pococke from Syria, is written in the Arabic character used in that country, and bears the date of 300 A.D., or 1500 A.D. It consists of 280 leaves, and is divided by the general and 77 particular maps, the latter consequently including all the parts of every climate. The general map was published by Dr. Vincent as "The Purposum of the Universall of Edrisi's Work in the Ecorolls was destroyed by the great fire of 1771.

The geography of Edrisi, in the original Arabic, was printed at Rome in 1692, at the Medesian press, from a manuscript preserved in the grand-ducal library at Florence. Both the paper and printing are exceedingly neat, but the volume swarms with typographical errors and forms only a clumsy epitome of the original work. The description of Mecca, which is unaccountably omitted, has been supplied by Pococke from his manuscript. In most bibliographical works this impression has been characterized as one of the rarest of books; but Adler, in a visit to Florence, found in the palace there 1129 copies, which were exposed to sale at a moderate rate. In 1619, two Oriental scholars, Gabriel Sauta and Jeanne Heronitas, published at Paris a Latin translation of Edrisi's work, bearing the title of Geographia Nubens; but it is far from accurate, particularly in the proper names. George Hieronymus Velachius, a German scholar, had prepared a copy of the Arabic original, with a Latin translation, which he purposed to have annotated with notes; but death prevented the execution of his design, and his manuscript remains deposited in the university library of Jena. See Ed. (12 Ar. Hen., n. 13) mentions that he was determined to re-edit this work, but he appears never to have executed his intention. The part relating to Africa, pre-eminent certainly in point of importance, was very ably edited in 1799 by Hartmann, who collected together all the notices relating to each particular country, and annexed the statements of the countrymen and contemporaries of Edrisi, so that his work forms nearly a complete body of Arabic geography, as far as relates to Africa. He afterwards published Hispania, 3 vol., Marburg, 1801-1818. A translation into French of the entire work, based on one of the MSS. of the Bibliotheque Nationale, was published by J. M. Dubois in 1840, and forms volumes v and vi. of the Recueil des Voyages issued by the Societé de Géographie; but a good edition of the original text is still a desideratum. A number of Oriental scholars at Leyden determined in 1861 to undertake the task: Spain and Western Europe were assigned to Professor Dory; Eastern Europe and Western Asia to Doctor Engelmann; Central and Eastern Asia to Dr. and Mrs. Goodyear; and Africa to Professor Goodyear. The first portion of the work appeared in 1866, under the title of Descriptions de l'Afrique et de l'Asie par Edrisi, texte arabe publi par R. Dory et M. J. de Goody, but the other collaborators have hitherto found impossible to furnish their quota.

EDUCATION. This article is mainly concerned with Ongas of the history of educational theories in the chief countries of Education, and their development. It has not been the object of the writer to give a history of the practical working of these theories, and still less to sketch the outlines of the science of teaching, which may be more conveniently dealt with under another head. The earliest education is that of the family. The child must be trained to acquire with its parents' convenience, and to acquire those little arts which will help in maintaining the economy of the household. It was long before any attempt was made to improve generations as they succeeded each other. The earliest schools were those of the priests. As soon as an educated priesthood had taken the place of the diviners and jugglers who abused the credulity of the earliest races, schools of the prophets became a necessity. The training required for ceremonials, the common life apart from the family, the accomplishments of reading and singing, afforded a nucleus for the organization of culture and an opportunity for the training of the scribe or scholar in advance of his age. Convenience and gratitude confirmed the monopoly of the clergy. The schools of Judea and Egypt were ecclesiastical. The Jews had but little effect on the progress of science, but our obligations to the priests of the Nile valley are great indeed. Much of their learning is obscure and the reason to conclude that there is no branch of science in which they did not progress at least so far as observation and careful registration of facts could carry them. They
were a source of enlightenment to surrounding nations. Not only the great lawyer of the Jews, but those who were most active in stimulating the nascent energies of Hellenism were careful to train themselves in the wisdom of the Egyptians. Greece, in giving an undying name to the literature of Alexandria, was only repaying the debt which she had incurred centuries before. Education became secular in countries where the priesthood did not exist as a separate body. At Rome, until Greece took her conqueror captive, a child was trained for the duties of life in the forum and the senate house. The Greeks were the first to develop a science of education distinct from ecclesiastical training. They divided their subjects of study into music and gymnastics, the one comprising all mental, the other all physical training. Music was at first little more than the study of the art of expression. But the range of intellectual education which had been developed by distinguished musical teachers was further widened by the Sophists, until it received a new stimulus and direction from the work of Socrates. Who can forget the picture left us by Plato of the Athenian palestra, in which Socrates was sure to find his most ready listeners and his most ardent disciples? In the intervals of running, wrestling, or the bath, the young Pheidrus or Thetastus discoursed with the philosophers who had come to watch them on the good, the beautiful, and the true. The lowest efforts of their teachers were to fit them to maintain any view they might adopt with acuteness, elegance, readiness, and good taste. Their highest efforts were to stimulate a craving for the knowledge of the unknowable, to rouse a dissatisfaction with received opinions, and to excite a curiosity which grew stronger with the revelation of each successive mystery. Plato is the author of the first systematic treatise on education. He deals with the subject in his earlier dialogues, he enters into it with great fulness of detail in the Republic, and it occupies an important position in the Laws. The views thus expressed differ considerably in particular, and it is therefore difficult to give concisely the precepts drawn up by him for our obedience. But the same spirit underlies his whole teaching. He never forgets that the beautiful is indistinguishable from the true, and that the mind is best fitted to solve difficult problems which has been trained by the enthusiastic contemplation of art. Plato proposes to inculcate education to the state. He lays great stress on the influence of race and blood. Strong and worthy children are likely to spring from strong and worthy parents. Music and gymnastics are to develop the emotions of young men during their earliest years,—the one to strengthen their character for the contest of life, the other to excite in them varying feelings of resentment or tenderness. Reverence, the ornament of youth, is to be called forth by well-chosen fictions; a long and rigid training in science is to precede discussion on more important subjects. At length the goal is reached, and the ripest wisdom is ready to be applied to the most important practice.

The great work of Quintilian, although mainly a treatise on oratory, also contains incidentally a complete sketch of a theoretical education. His object is to show us how to form the man of practice. But what a high conception of practice is his! He wrote for a race of rulers. He inculcates much which has been attributed to the wisdom of a later age. He urges the importance of studying individual dispositions, and of tenderness in discipline and punishment. The Romans understood no systematic training except in oratory. In their eyes every citizen was a born commander, and they knew of no science of government and political economy. Cicero speaks slightly even of jurisprudence. Any one, he says, can make himself a jurist in a week, but an orator is the production of a lifetime. No statement can be less true than that a perfect orator is a perfect man. But wisdom and philanthropy broke even through that barrier, and the training which Quintilian expounds to us as intended only for the public speaker, would, in the language of Milton, fit a man to perform justly, wisely, and magnanimously all the offices, both public and private, of peace and war.

Such are the ideas which the old world has left us. On one side man beautiful, active, clever, receptive, emotional, quick to feel, to show his feeling to argue, to refine, greedy of the pleasures of the world, perhaps a little neglectful of its duties, learning restrained as an unjust stinting of the bounty of nature, inquiring eagerly into every secret, strongly attached to the things of this life, but elevated by an unabated striving after the highest ideal, setting no value but upon faultless abstractions, and seeing reality only in heaven, on earth mere shadows, phantoms, and copies of the unseen. On the other side man practical, energetic, eloquent, tinged but not imbued with philosophy, trained to spare neither others, reading and thinking only with an apology, best engaged in defending a political principle, in maintaining with gravity and solemnity the conservation of ancient freedom, in leading armies through unexplored deserts, establishing roads, fortresses, settlements, the results of conquest, or in ordering and superintending the slow, certain, and utter annihilation of some enemy of Rome. Has the modern world ever surpassed their type? Can we in the present day produce anything by education except by combining, blending, and modifying the self-culture of the Greek or the self-sacrifice of the Roman?

The literary education of the earliest generation of Christians was obtained in the pagan schools, in those great academies which existed even down to the 5th century, which flourished in Europe, Asia, and Africa, and attained perhaps their highest development and efficiency in Gaul. The first attempt to provide a special education for Christians was made at Alexandria, and is illustrated by the names of Clement and Origen. The later Latin fathers took a bolder stand, and rejected the suspicious aid of heathenism. Tertullian, Cyprian, and Jerome washed the antagonism between Christianity and Paganism to be recognized from the earliest years, and even Augustine condemned with harshness the culture to which he owed so much of his influence, the worship of the Gnostics of the Middle Ages. It was either that of the monastery or the church. The Judent was a spot, and the teaching which they proscribed. Long hours were spent in the duties of the church, and in learning to take a part in elaborate and useless ceremonies. A most important part of the monastery was the writing room, where mssals, psalters, and breviaries were copied and illuminated, and too often a masterpiece of classic literature was effaced to make room for a treatise of one of the fathers or the sermon of an abbot. The discipline was hard, the rod ruled all with indiscernible and impartial severity. How many generations have had to suffer for the flagellants of those times! Hatred of learning, antagonism between the teacher and the taught, the belief that no training can be effectual which is not repulsive and distasteful, that no subject is proper for instruction which is acquired with ease and pleasure,—these ideals of false education have their root and origin in monkish cruelty. The joy of human life would have been in danger of being stamped out if it had not been for the warmth and colour of a young knight's boyhood. He was equally well
broken in to obedience and hardship, but the obedience was the
willing service of a mistress whom he loved, and the hardship
the permission to share the danger of a leader whom he
emulated. The seven arts or manner of monastic training were Grammar,
Dialectics, Rhetoric, Music, Arithmetic, Geometry, Astronomy,
which together formed the trivium and quadrivium, the seven
years' course, the divisions of which have profoundly affected our modern training.

The schools of Charles the Great have lately been investi-
gated as one of these liberal arts. Cassiodorus, who wrote De Operibus
Disciplinis about 500, was also largely used as a text book in the schools. Astronomy
was taught by the Cisto-Janus, a collection of doggerel
hexameters like the Propria gus maribus, which contained the chief
festivals in each month, with a memoria technica for recollecting when they occurred. The seven
knights accomplishments, as historians tell us, were to ride, to
swim, to shoot with the bow, to box, to hawk, to play
chess, and to make verses. The verses thus made were
not in Latin, but sonnets of Ovid or Horace, whose
pagan beauties were wrested into the service of religion, but
sonnets, ballads, and canzonets in soft
Provençal or melodious Italian. In nothing, perhaps, is the
difference between these two forms of education more clearly shown
than in their relations to women. A young monk was
brought up to regard a woman as the worst among the
many temptations of St Antony. His life knew no
domestic tenderness or affection. He was surrounded and
cared for by celibates, to be himself a celibate. A page
was trained to receive his best reward and worst punishment
from the smile or frown of the lady of the castle, and as
he grew to manhood to cherish an absorbing passion as
the strongest stimulus to a noble life, and the contempla-
tion of female virtue, as embodied in an Isolde or a Beatrice,
as the truest earnest of future immortality.

Both these forms of education disappeared before the
Renaissance and the Reformation. But we must not suppose that no efforts were made to improve upon the
narrowness of the schoolmen or the idleness of chivalry.
The system of Charles the Great have lately been investi-
gated by Mr Mullinger, but we do not find that they
materially advanced the science of education. Vincent
of Beauvais has left us a very complete treatise on
teaching, written about the year 1245. He was the
friend and counsellor of St Louis, and we may discern his influence in the instructions which were left by that saintful
king for the guidance of his son and daughter through life.
The end of this period was marked by the rise of
universities. Bologna devoted itself to law, and numbered
12,000 students at the end of the 12th century. Salerno
adopted as its special province the study of medicine, and
Paris was thronged with students from all parts of Europe,
who were anxious to devote themselves to a theology which
passed by indefinite gradations into philosophy. The
14th and 15th centuries witnessed the rise of universities and
academies in almost every portion of Europe. Perhaps the
most interesting among these precursors of a higher culture
were the Brethren of the Common Life, who were domiciled in
the rich meadows of the Yssel, in the Northern Nether-
lands. The metropolis of their organization was Deventer,
the best known name among them that of Gerhard Groote.
They devoted themselves with all humility and self-sacrifice
to the education of children. Their schools were crowded.
Boys-and-number 1200 pupils, Zwolle 1600. For a
hundred years no part of Europe shone with a brighter
lustre. As the divine comedy of Dante represents for us
the learning and piety of the Middle Ages in Italy, so the
Imitation of Thomas à Kempis keeps alive for us the
memory of the purity and sweetness of the Dutch
community. But they had not sufficient strength to preserve
their supremacy among the necessary developments of the
age. They could not support the glare of the new Italian
learning; they obtained, and it may be feared deserved, the
title of obscurantists. The Epitome Obscurorum Vrorum,
the wittiest squib of the Middle Ages, which Luther and Melanchthon
was the true and so subtle in its satire that it was hailed as a blow struck
in defence of the ancient learning, consists in great part of the
lamentations of the brethren of Deventer over the new age,
which they could not either comprehend or withstand.

The education of the Renaissance is best represented by the
name of Erasmus, that of the Reformation by the names of
Luther and Melanchthon. We have no space to give an
account of that marvellous resurrection of the mind and
spirit of Europe when touched by the dead hand of an
extinct civilization. The history of the revival of letters
belongs rather to the general history of literature than to
that of education. But there are two names whom we
ought not to pass over. Vittorino da Feltre was summoned
by the Gonzagas to Mantua in 1424; he was lodged in a
spacious palace, with galleries, halls, and colonnades
decorated with frescoes of playing children. In person he
was small, quick, and lively—a born schoolmaster, whose
whole time was spent in devotion to his pupils. We are told
of the children of his patron, how Prince Gonzaga recited
200 verses of his own composition at the age of fourteen,
and how Princess Cecilia wrote elegant Greek at the age of
ten. Vittorino died in 1477. He seems to have reached
the highest point of excellence as a practical schoolmaster
whom the Italian Renaissance, on the other hand, had
left us in his Cortigiano the sketch of a cultivated
nobleman in those most cultivated days. He shows by
what precepts and practice the golden youths of Verona
and Venice were formed, who live for us in the plays of
Shakespeare as models of knightly excellence. For our
instruction, it is better to have recourse to the pages of
Erasmus. He has written the most minute account of his
method of teaching. The child is to be formed into a good
Greek and Latin scholar and a pious man. He fully
grasps the truth that improvement must be natural and
gradual. Letters are to be taught playing. The rules of
grammar are to be few and short. Every means of arousing
interest in the work is to be fully employed. Erasmus is
no Ciceronian. Latin is to be taught so as to be of
use—a living language adapted to modern wants. Children
should learn an art—painting, sculpture, or architecture.
Idleness is above all things to be a bud. The education
of girls is as necessary and important as that of boys.
Much depends upon home influence; obedience must be
strict, but not too severe. We must take account of
individual peculiabilities, and not force children into
clusters against their will. We shall obtain the best result
by following nature. It is easy to see what a contrast this
scheme presented to the monkish training,—to the routine
of useless technicalities enforced amidst the shouts of
teachers and the lamentations of the taught.

Still this culture was but for the few. Luther brought
Reformation to the schoolmaster into the cottage, and laid the foundations
of the system which is the chief honour and strength of
modern Germany, a system by which the child of the
humblest peasant, by slow but certain gradations, receives
the best education which the country can afford. The
precepts of Luther found their way into the hearts of his
countrymen in short, pithy sentences, like the sayings of
poor Richard. The purification of thought and action went hand in hand with the purification of religion,
and these claims to affection are indisputably united in the
minds of his countrymen. Melanchthon, from his editions
school books and his practical labours in education, earned him the title of Inspector Germanicus. Aristotle had been succeeded from his predecessors in the schools, and the laudation of his importance of Greek, the terror of the obscurantists, is the author of a Greek grammar. He wrote elementary text books on each department of the trivium—grammar, rhetoric, and logic. He wrote Introductory Lessons on physical science. He lectured at the university of Vittenberg, and for ten years, from 1519 to 1529, kept school privately in his own house. Horace was his private pupil. His pupils were taught to learn the love of his heart, ten lines at a time. The tender and lines of his well-known portraits show clearly the master of the painful, accurate scholar, and contrast with the bare power of the genial Luther. He in 1560, lacked for the church which he has to found. The difference to carry Protestantism the house of the peasant, he at least made it acceptable to the health of the peasant, he at least made it acceptable to the present day all over Europe, and was known how to combine and to trace the whole course of his influence, but he is in all probability as much answerable as any one for the great emphatic reformation which has worked in the 16th century, and which went far to ruin and corrupt its literature. Nowhere perhaps had he more effect than in England. Our older public schools, on breaking with the ancient faith, looked to Sturm as their model of Protestant education. His name and example became familiar to us by the exertions of his friend Ascham Westminster, under the long reign of Busby, received a form which was generally accepted as the type of a gentleman's education.

The Public School Commission of 1862 found that the plan had been used by the great citizens of Strasburg, and copied by his admirers, had remained unchanged until within the memory of the present generation. Wolfgang Ratke or Ratze. Ratzeus was born in Holstein in 1571. He anticipated some of the best improvements in the method of teaching which have been made in modern times. He was like many of those who have tried to improve existing methods in advance of his age, and he was rewarded for his labours at Augsburg, Weimar, and Kothen by persecution and imprisonment. Can we wonder that education has improved so slowly when so much pain has been taken to silence and extinguish those who have devoted themselves to its improvement? His chief rules are: 1. Begin everything with prayer. 2. Do everything in order, following the course of nature 3. One thing at a time. 4. Often repeat the same thing. 5. Teach everything first in the mother tongue. 6. Proceed from the mother tongue to other languages. 7. Teach without compulsion. Do not beat children to make them learn. Pupils must love their masters, not hate them. Nothing should be learnt by heart. Sufficient time should be given to play and recreation. Learn one thing before going on to another. Do not teach for two hours consecutively. 8. Uniformity in teaching, also in school books, especially grammars, which may with advantage be made comparative. 9. Teach a thing first, and then the reason of it. Give no rules before you have given the examples. Teach no language out of the grammar, but out of authors. 10. Let everything be taught by induction and experiment. Most of these precepts are accepted by all good teachers in every country, all of them are full of wisdom. Unfortunately their author saw the faults of the teaching of his time more clearly than the means to remove them, and he was more successful in forming precepts than in carrying them out. Notwithstanding these drawbacks, he deserves a honourable place among the forerunners of a rational education.

John Amos Comenius was the antithesis to Sturm, and Constance a greater man than Ratze. Born a Moravian, he passed a wandering life, among the troubles of the Thirty Years' War in poverty and obscurity. But his ideas were accepted by the most advanced thinkers of the age, notably in many respects by our own Milton, and by Ossenborn the chancellor of Sweden. His school books were spread throughout Europe, The Janua Litterarum Renovata was translated into twelve European and several Asiatic languages. His works, especially the Didascalica magna, an encyclopaedia of the science of education, are constantly reprinted at the present day, and the system which he sketched will be found to forecast the education of the future. He was repelled and disgusted by the long delays and pedantry of the schools. His highest mind conceived that if teachers would but follow nature instead of forcing it against its bent, take full advantage of the innate desire for activity and growth, all men might be able to learn all things. Languages should be taught as the mother tongue is taught, by conversations on ordinary topics, pictures, object lessons, should be freely used; teaching should go hand in hand with a cheerful, elegant, and happy life. Comenius included in his course...
the teaching of the mother tongue, singing, economy, and politics, the history of the world, physical geography, and a knowledge of arts and handicrafts. But the principles on which he most insisted, which forms the special point of his teaching, and in which he is followed by Milton, is that the teaching of words and things must go together hand in hand. When we consider how much time is spent over new languages, what waste of energy is lavished on mere preparation, how it takes so long to lay a foundation that there is no time to rear a building upon it, we must conclude that it is in the acceptance and development of this principle that the improvement of education will in the future consist. Any one who attempts to isolate this great lesson will find that its first principles are contained in the writings of Comenius. But this is not the whole of his claim upon our gratitude. He was one of the first advocates of the teaching of science in schools. His kindness, gentleness, and sympathy make him the forerunner of Pestalozzi. His general principles of education would not sound strange in the treatise of Herbert Spencer.

The Protestant schools were now the best in Europe, and the monkish institutions were left to decay. Catholics would have remained behind in the race if it had not been for the Jesuits. Ignatius Loyola gave this direction to the order which he founded, and the programme of studies, which dates from the end of the 16th century, is in use, with certain modifications, in English Jesuit schools at the present day. In 1550 the first Jesuit school was opened in Germany, in 1700 the order possessed 612 colleges, 157 normal schools, 59 novitiates, 340 residences, 200 missions, 28 professorial homes, and 24 universities. The college of Clermont had 3000 students in 1695. Every Jesuit college was divided into two parts, the one for higher the other for lower education,—the studia superiores, and the studia inferiores. The studia superiores, answering to the modern gymnasiaum, was divided into two sections. The principles were teaching grammar (rudiments), grammar (accidence), and syntax, the last two humanity and rhetoric. The motto of the school was leges, scriba, locuplet. —you must learn not only to read and write a dead language, but to talk. Pursian was even more exaggerated than by Sturm. No word might be used which did not rest upon a special authority. The composition of Latin verses was strongly encouraged, because they were a convenient sacrifice. Whatever may have been the service of the Jesuits in past times, we have little to hope for them in the improvement of education at present. Governments have, on the whole, acted wisely by checking and suppressing their colleges. The ratio studiorum is antiquated and difficult to reform. In 1531 it was brought more into accordance with modern ideas by Roothaan, the general of the order. Becker has made a more powerful attack on anything, pursued a policy oflegation. The Italian Government, in taking possession of Rome, found that the pupils of the Collegio Romano were far below the level of modern requirements.

It may be imagined that, by this organization both Catholics and Protestants were apt to degenerate into pedantry, both in name and purpose. The schoolmaster had a great deal too much the best of it. The Latin school was tabulated and organized until every half hour of a boy's time was occupied; the Jesuit school took possession of the pupil body and soul. It was, therefore, to be expected that a stand should be made for common sense in the direction of practice rather than theory, of wisdom instead of learning. Montaigne has left us the most delightful utterances about education. He says that the faults of the education of his day consist in over-estimating the intellect and rejecting morality, in exaggerating memory and deprecating useful knowledge. He recommends a tutor who should draw out the pupil's own power and originality, to teach how to live well and to die well, to enforce a lesson by practice, to put the mother tongue before foreign tongues, to teach all many exercises, to educate the perfect man. Away with force and compulsion, with severity and the rod. John Locke, more than a Locke, hundred years afterwards, made a more powerful and 1692.-systematic attack on useless knowledge. His theory of 1704. the origin of ideas led him to assign great importance to education, while his knowledge of the operations of the human mind lends a special value to his advice. His treatise has received in England more attention than it deserves, partly because we have so few books written upon the subject on which he treatises. Part of which he treatises is used at the present day; part it would be well to follow, or at any rate to consider seriously, especially he condemn-
tion of repetition by heart as a means of strengthening the memory, and of Latin verses and themes. He sets before himself the production of the man, a sound mind in a sound body. His knowledge of medicine gives great value to his advice on the earliest education, although he probably exaggerates the benefits of enforced hardships. He recommends home education without harshness or severity of discipline. Emulation is to be the chief spring of action, knowledge is far less valuable than a well-trained mind. He prizes that knowledge most which fits a man for the duties of the world, speaking languages, accounts, history, law, logic, rhetoric, natural philosophy. He inculcates the importance of drawing, dancing, riding, fencing, and trades. The part of his advice which made most impression upon his contemporaries was the teaching of reading and arithmetic by well-considered games, the discouragement of an undue absorption of language, as that of the treatise of Locke, and probably refers to later time, in the better days of French education. The success of the Jansenists was too much for the jealousy of the Jesuits. Neither poetry, nor wit, nor virtue could save them. A light was quenched which would have given an entirely different direction to the education of France and of Europe. No one can visit without emotion that retired nook which lies hidden among the forests of Versalles, where the old brick dove-cot, the pillars of the church, the trees of the desert alone remain to speak to us of Pascal, Racine, and the Mère Angélique. The principles of Port Royal found some supporters in a later time, in the better days of French education before monarchy and militarism had crushed the life out of the nation. Rollin is never mentioned without the epithet bon, a testimony to his wisdom, virtue, and simplicity. Feuillon may be reckoned as belonging to the same school, but he was more fitted to mix and grapple with mankind.

Far more important in the literature of this subject than the treatise of Locke is the Tractate of Education by Milton, "the few observations," as he tells us, "which flowered off, and are, as it were, the burnishings of many hours of repetition." This essay is addressed to Samuel Hartlib, a great friend of Comenius, and probably refers to a project of establishing a university in London. "I will point you out," Milton says, "the right path of a virtuous and noble education,—labours, indeed, at first ascent, but else so smooth and green and full of godly prospects and melodious sounds on every side, that the harp of Orpheus is not more charming. This is to be done between twelve and one-and-twenty, in an academy containing about a hundred and thirty scholars, which shall be at once school and university,—not needing a remove to any other house of scholarship except it be some peculiar college of law and physics, where they mean to be practitioners." The important truth enunciated is quite in the spirit of Comenius that the learning of things and words is to go hand in hand. The curriculum is very large. Latin, Greek, arithmetic, geometry, agriculture, geography, physiology, physics, trigonometry, fortification, architecture, engineer, navigation, anatomy, medicine, poetry, Italian, law both Roman and English, Hebrew with Chaldee and Syrian, history, oratory, poetry. But the scholars are not to be trained for war, both on foot and on horseback, to be practised "in all the locks and grapes of wrestling," they are to "recreate and compose their travailing spirits with the divine harmonies of music heard or learnt." "In those venerable seasons of the year when the air is calm and pleasant, they were an injurious and a sullenness against nature not to go out and see her riches, and partake in her rejoicing with heaven and earth. I should not then be a persuader to them of studying much then, after two or three years that they have well laid their grounds, but to ride out in companies with prudent and steady guides to all the quarters of the land." The whole treatise is full of wisdom, and deserves to be studied again and again. Vain glory as it may appear to some at first sight, if translated into the language of our own day, it will be found to abound with sound practical advice. Only," Milton says in conclusion, "I believe that this is not a book for the cursory man to shoot who counts himself a teacher, but will require sinews almost equal to those which Homer gave Ulysses; yet I am persuaded that it may prove much more easy in the essay than it now seems at a distance, and much more instructive if God have so decreed and the age have spirit and capacity enough to apprehend." Almost while Milton was writing this treatise, he might have seen an attempt to realize something of his ideal in Port Royal. What a charm does this name awaken! Yet how few of us have made a pilgrimage to that secluded valley! Here we find the first time in the modern world, the highest gifts of the greatest men of a country applied to the business of education. Arnauld, Lancelot, Nicole did not commence by being educational philosophers. They began with a small school, and developed their method as they proceeded. Their success has seldom been surpassed. But a more lasting memorial than their pupils are the books which they sent out, which bear the name of their cloister. The Port Royal Logic, General Grammar, Greek, Latin, Italian, and Spanish Grammars, the Garden of Greek Flowers which taught Greek to Gibbon, the Port Royal Geometry, and their translations of the classics held the first place among school books for more than a century. The success of the Jansenists was too much for the jealousy of the Jesuits. Neither poetry, nor wit, nor virtue could save them. A light was quenched which would have given an entirely different direction to the education of France and of Europe. No one can visit without emotion that retired nook which lies hidden among the forests of Versalles, where the old brick dove-cot, the pillars of the church, the trees of the desert alone remain to speak to us of Pascal, Racine, and the Mère Angélique. The principles of Port Royal found some supporters in a later time, in the better days of French education before monarchy and militarism had crushed the life out of the nation. Rollin is never mentioned without the epithet bon, a testimony to his wisdom, virtue, and simplicity. Feuillon may be reckoned as belonging to the same school, but he was more fitted to mix and grapple with mankind.

No history of education would be complete without the name of August Hermann Francke, the founder of the school of Pietists, and of a number of institutions which now form almost a suburb in the town of Halle to which his labours were devoted. The first scenes of his activity were Leipzig and Dresden; but in 1629, at the age of 29, he was made pastor of Glucka near Halle, and professor in the newly established university. Three years later he commenced his poor school with a capital of seven guineas which he found in the poor box of his house. At his death in 1727 he left behind him the following institutions—a pedagogium, or training college, with 82 scholars and 70 teachers receiving education, and attendants, the Latin school of the orphan asylum, with 3 inspectors, 32 teachers, 490 scholars, and 10 servants; the German town schools, with 4 inspectors, 98 teachers, 3 female teachers, and 1725 boys and girls. The establishment for orphan children contained 109 boys, 34 girls, and 10 attendants. A cheap public dining table was attended by 255 students and 360 poor scholars, and besides this there was an apothecary's and a bookseller's shop. Francke's principles of education were strictly religious. Hebrew was included in his curriculum, but the heathen classics were treated with slight respect. The Homilies of Macarius were read in the place of Thucydes. As might be expected, the rules laid down for discipline and moral training breathed a spirit of deep affection and sympathy. Francke's great merit, however, is to have left us a model of institutions by which children of all ranks may receive an education to fit them for any position in life. The Franckesche Stiftungen are still, next to the university, the centre of the intellectual life of Halle, and the different schools which they contain give instruction to 3500 children.

We now come to the book which has had more influence than any other on the education of later times. The "Emile" of Rousseau was published in 1762. It produced an
astonishing effect throughout Europe. Those were days when the cultivated world vibrated to any touch of new philosophy. French had spread the general medium of thought. French learning stood in the same relation to the rest of Europe as German learning does now; and any discovery of D'Alembert, Rousseau, or Maupertuis travelled with inconceivable speed from Vermissis to Schleswig, from the Spree to the Rhine. Kant's distant home of Königsberg broke for one day through his habits, more regular than the town clock, and stayed at home to study the new revelation. The burthen of Rousseau's message was nature, such a nature as never did and never will exist, but still a name for an ideal worthy of our struggles. He revolted against the false civilization which he saw around him; he was penetrated with sorrow at the shams of government and society, at the misery of the poor existing side by side with the heartlessness of the rich. The child should be the pupil of nature. He lays great stress on the earnest education. The chief year of life is in every respect the most important. Nature must be closely followed. The child's tears are petitions which should be granted. The naughtiness of children comes from weakness; make the child strong and he will be good. Children's destructiveness is a form of activity. Do not be too anxious to make children talk; he satisfied with a small vocabulary. Lay aside all peddled caps and baby jumpers. Let children learn to walk by learning that it hurts them to fall. Do not insist too much on the duty of obedience as on the necessity of submission to natural laws. Do not argue too much with children; educate the heart to wish for right actions, before all things study nature. The chief moral principle is that for Emile is to be taught by the real things of life, by observation and experience. At twelve years old he is scarcely to know what a book is; to be able to read and write at fifteen is quite enough. We must first make him a man, and that chieflly by athletic exercises. Education should be to measure, count, and weigh accurately; teach him to draw; tune his ear to time and harmony; give him simple food, but let him eat as much as he likes. Thus at twelve years old Emile is a real child of nature. His carriage and bearing are fair and confident, his nature open and candid, his speech simple and to the point; his ideas are few but clear; he knows nothing by learning, much by experience. He has read deeply in the book of nature. His mind is not on his tongue but in his head. He speaks only one language, but knows what he is saying, and can do what he cannot describe. Routine and custom are unknown to him; authority and example affect him not; he does what he thinks right. He understands nothing of duty and obedience, but he will do what you ask him, and will expect a similar service of you in return. His strength and body are fully developed; he is first-rate at running, jumping, and judging distances. Should he die at this age he will so far have lived his life. From twelve to fifteen Emile's practical education is to continue. He is still to avoid books which teach not learning itself but to appear learned. He is to be taught and to practice some handicraft. Half the value of education is to waste time wisely, to tide over dangerous years with safety, until the character is better able to stand temptation. At fifteen a new era commences. The passions are awakened; the care of the teacher should now redouble; he should never leave the helm. Emile having gradually acquired the love of himself and of those immediately about him, will begin to love his kind. Now is the time to teach him history, and the mechanism of society, the world it is, and as it might be. Still an encumbrance of useless and burdensome knowledge is to be avoided. Between this age and manhood Emile learns all that it is necessary for him to know. It is, per-
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The doctrines of the philanthropists; the limits of learning were enlarged; study became a pleasure instead of a pain, scope was given for healthy exercise, the school became light, airy, and cheerful. A charge of superficiality and weakness was brought against this method of instruction, but the gratitude which our generation of teachers owes to the unabated love and faith of these devoted men cannot be denied or refused. The end of the 18th century saw a great development given to classical studies. The names of Cellarius, George, Ernesti, and Heyne are perhaps more celebrated as scholars than schoolmasters. To them we owe the great importance attached to the study of the classics, both on the Continent and in England. They brought into the schools the philology which F. A. Wolf had organized for the universities. Pestalozzi, on the other hand, was completely and entirely devoted to education. His greatest merit is that he set an example of absolute self-abnegation, that he lived with his pupils, played, starved, and suffered with them, and clung to their minds and hearts with an affectionate sympathy which revealed to him every minute difference of character and disposition. Pestalozzi was born at Zurich in 1746. His father died when he was young, and his mother, who was of no good condition, brought him up by her motherly labours. His earliest years were spent in schemes for improving the condition of the people. The death of his friend Bluntschli turned him from political schemes, and induced him to devote himself to education. He married at 23, and bought a piece of waste land in Aargau, where he attempted the cultivation of madder. Pestalozzi knew nothing of business, and the plan failed. Before then he had opened his farm-house as a school, but in 1780 he had to give this up also. His first book published at this time was The Evening Hours of a Hermits, a series of aphorisms and reflections. This was followed by his masterpiece, Leonard and Gertrude, an account of the gradual reformation, first of a household, and then of a whole village, by the efforts of a good and devoted woman. It was read with avidity in Germany, and the name of Pestalozzi was rescued from obscurity. His attempts to follow up this literary success were failures. The French invasion of Switzerland in 1798 brought into relief his truly heroic character. A number of children were left in Canton Unterwalden on the shores of the Lake of Lucerne, without parents, home, food, or shelter. Pestalozzi collected a number of them into a deserted convent, and spent his energies in reclaiming them. "I was," he says, "from morning till evening, almost alone in their midst. Everything which was done for their body or soul proceeded from my hand. Every assistance, every help in time of need, every teaching which they received, came immediately from me. My hand lay in their hand, my eye rested on their eye, my tears flowed with theirs, and my laughter accompanied theirs. They were out of the world, they were out of Stanz; they were with me, and I was with them. Their soup was mine, their drink was mine. I had nothing, I had no housekeeping, no friend, no servants around me; I had them alone. Were they well I stood in their midst; were they ill, I was at their side. I slept in the middle of them. I was the last who went to bed at night, the first who rose in the morning. Even in bed I prayed and taught with them until they were asleep—the time I wished it to be so." Thus he passed the winter, but in June 1799 the building was required by the French for a hospital, and the children were dispersed. We have dwelt especially on this episode of Pestalozzi's life, because in this devotion lay his strength. In 1801 he gave an exposition of his theories on education in the book How Gertrude teaches her Children. His method is to proceed from the easier to the more difficult. To begin with observation, to pass from observation to consciousness, from consciousness to speech. Then come measuring, drawing, writing, numbers, and so reckonings. In 1839 he had been enabled to establish a school at Burgdorf, where he remained till 1854. In 1802, he went as deputy to Paris, and did his best to interest Napoleon in a scheme of national education, but the great conqueror said that he could not trouble himself about the alphabet. In 1805 he removed to Yverdon on the Lake of Neufchatel, and for two years worked steadily at his task. He was visited by all who took interest in education,—Talleyrand, Cape d'Istria, and Madame de Stael. He was praised by Wilhelm von Humboldt and by Fichte. His pupils included Ramsauer, Delbruck, Blochmann, Carl Ritter, Froebel, and Zeller. About 1815 discussions broke out among the teachers of the school, and Pestalozzi's last ten years were chequered by weariness and sorrow. In 1825 he retired to Neufib, the home of his youth, and after writing the adventures of his life, and his last work, the Swiss Song, he died in 1827. As he said himself, the real work of his life did not lie in Burgdorf or in Yverdon, the products rather of his weakness than of his strength. It lay in the principles of education which he practised, the development of his observation, the training of the whole man, the sympathetic application of the teacher to the taught, of which he was an example in his six months' labours at Stanz. He shewed what truth there was in the principles of Comenius and Rousseau, in the union of training with information, and the submissive following of nature, he has had the deepest effect on all branches of education since his time, and his influence is far from being exhausted.

The Emile of Rousseau was the point of departure for an awakened interest in educational theories which has continued unto the present day.

Few thinkers of eminence during the last hundred years have failed to offer their contributions more or less directly on this subject. Poets like Richter, Herder, and Goethe, philosophers such as Kant, Fichte, Hegel, Schlegel, Schopenhauer, psychologists such as Herbart and Beneke, have left directions for our guidance. Indeed, during this time the sciences of education or pedagogy, as the Germans call it, Pedagogik may have been said to have come into existence. It has gone from the sphere of artificial science to a definite study of the nature of man, of man's powers and their development, and of the means of training the mind of the infant. It has gone from the abstracted but little attention in England, but it is an important subject of study at all German universities, and we may hope that the example given by the establishment of chairs of education in the Scotch universities may soon be followed by the other great centres of instruction in Great Britain. Jean Paul called his book Leben, after Richter, the Roman goddess to whom the father dedicated his new-born child, in token that he intended to rear it to manhood. He lays great stress on the preservation of individuality of character. He believes that man would be so far as possible a free agent, a free being, if he were a free agent. He has the children taught in an nursery, free to run about, free to make the best of themselves, free to develop their own character, free to form their own character, free to gain their freedom. But this is the history of the future, the history of the future. The most characteristic passage is that which describes the father's return to the country of education after a year's absence. As he is riding alone, wondering in what guise he will meet his son, a multitude of horses rush by at full gallop, "The monstrous hairy-whirls past the wanderer, a fair boy among the keepers looks at him with surprise, pulls in, leaps down, and embraces his father." He then learns that an agricultural life had not suited his son, that the superiors had discovered that he was fond of animals, and had set the young peasant to the occupation of which nature had destined him. The system of Jacotot has aroused great interest in this Jacotot country. His author was born at Dijon in 1770. In 1815 he retired to Louvain and became professor there, and director of the Belgian military school. He died in 1840. His method of teaching is based on three principles:

Pestalozzi, 1746-1827.
1. All men have an equal intelligence.
2. Every man has received from God the faculty of being able to instruct himself.
3. Every thing is in every thing.

The first of these principles is certainly wrong, although Jacotot tried to explain it by asserting that, although men had the same intelligence, they differed widely in the will to make use of it. Still it is important to assert that nearly all men are capable of receiving some intellectual education, provided the studies to which they are directed are wide enough to engage their faculties, and the means taken to interest them are sufficiently ingenious. The second principle lays down that it is more necessary to stimulate the pupil to learn for himself, than to teach him didactically. The third principle explains the process which Jacotot adopted. To one learning a language for the first time he would give a short passage of a few lines, and encourage the pupil to study the first words, then the letters, then the grammar, then the full meaning of the expressions, until by iteration and accretion a single paragraph took the place of an entire literature. Much may be effected by this method in the hands of a skilful teacher, but a charlatan might make it an excuse for ignorance and neglect.

Among those who have improved the methods of teaching, we must mention Bell and Lancaster, the joint-discoverers of the method of mutual instruction, which, if it has not effected everything which its founders expected of it, has produced the system of pupil-teachers which is now common in our schools. Froebel also deserves an honourable place as the founder of the Kindergarten, a means of teaching young children by playing and amusement. His plan has a far wider significance than this limited development of them, is likely to be fruitful of results to future workers.

The last English writers on education are Mr Herbert Spencer and Mr Alexander Bain, the study of whose writings will lead us in those regions of pedagogics which have been most recently explored. We need not follow Mr Spencer into his defence of science as the worthiest object of study, or in his rules for moral and physical training, except to say that they are sound and practical. In writing of intellectual education, he insists that we shall attain the best results by closely studying the development of the mind, and availing ourselves of that amount of force which nature puts at our disposal. The mind of every being is naturally active and vigorous, indeed it is never at rest. But for its healthy growth it must have something to work upon, and, therefore, the teacher must watch its movements with the most sympathetic care, in order to supply exactly that food which it requires at any particular time. In this way a much larger cycle of attainments can be compassed than by the adoption of any programme or curriculum, however carefully drawn up. It is no good to teach what is not remembered; the strength of memory depends on attention, and attention depends upon interest. To teach without interest is to work like Sisyphus and the Danaides. Arouse interest if you can, rather by high means than by low means. But it is a saving of power to make use of interest which you have already existing, and which, unless dried up or distorted by injudicious violence, will naturally lead the mind into all the knowledge which it is capable of receiving. Therefore, never from the first force a child's attention; leave off a study the moment it becomes wearisome, never let a child do what it does not like, only take care that when its liking is in activity a choice of good as well as evil shall be given to it.

Mr Bain's writings on education, which are contained in some articles in the Fortnightly Review, and in two articles in Mind (Nos. v. and vii.) are extremely valuable. Perhaps the most interesting part of them consists in his showing what may be called the "correlation of forces in man" helps us to a right education. From this we learn that emotion may be transformed into intellect, that sensation may exhaust the brain as much as thought, and we may infer that the chief duty of a schoolmaster is to stimulate the powers of each brain under his charge to the fullest activity, and to apprise them in that ratio which will best conduce to the most complete and harmonious development of the individual.

It seems to follow from this sketch of the history of Conical-education that, in spite of the great advances which have been made of late years, the science of education is still far in advance of the art. Schoolmasters are still spending their best energies in teaching subjects which have been universally condemned by educational reformers for the last two hundred years. The education of every public school is a farcage of rules, principles, and customs derived from every age of teaching, from the most modern to the most remote. It is plain that the science and art of teaching will never be established on a firm basis until it is organized on the model of the sister art of medicine. We must pursue the patient methods of induction by which other sciences have reached the stature of maturity; we must discover some means of registering and tabulating results; we must invent a phraseology and nomenclature which will enable results to be accurately recorded; we must place education in its proper position among the sciences of observation. A philosopher who should succeed in doing this would be venerated by future ages as the creator of the art of teaching.

It only remains now to give some account of the very large literature of the subject.

The history of education was not investigated till the beginning of the present century, and since then little original research has been made except by Germans. Whilst acknowledging our great obligations to the German historians, we cannot but regret that all the investigations have belonged to the same nation. For instance, one of the best treatises on education written in the 16th century is Mulscher's Positions, which has never been reprinted, and is now a literary curiosity.

Mangeisdorf and Ruhkopf attempted histories of education at the end of the last century, but the first work of note was F. H. Ch. Schwarz's Geschichte der Erziehung. Other writers followed; but from the time of its appearance till within the last few years, by far the most readable and the most read work on the history of education was that of Karl von Raumer. Raumer, however, is too chatty and too religious to pass for "wissenschaftlich," and the standard history is now that of Karl Schmid. The Roman Catholics have not been content to adopt the works of Protestants, but have histories of their own. These are the very pleasing sketches of L. Kellner and the somewhat larger history by Stoos. When we come to writers who have produced sketches or shorter histories, we find the list in Germany a very long one. Among the best books of this kind are Fried. Dittner's Geschichte and Drose's Pedagogische Charakterbilder. An account of this literature will be found in J. Chr. G. Schumacher's paper among the Pedago- gische Studien, edited by Dr Reiss. For biographies the pedagogic encyclopedias may be consulted, of which the most useful is the Encyklopädie der studirenden und arbeitenden Ge-schichtler of K. A. Schmid, a great work in 11 or 12 vols. not yet completed, although the second edition of the early vols.
is already announced. The Roman Catholics have also begun a large encyclopedia edited by Rolfs and Pfister. No similar work has been published in France, but a Cyclopedia of Education in one volume has lately been issued by Dr. Arnold, and other writers are Kiddle and Scherr, and in this the are articles by English as well as American writers. In French the *Enquinte d'un systeme complet d' Education*, by Th. Fritz (Strasbourg, 1841), has a sketch of the history, which is as a sketch is worth notice. Jules Taras has written a useful little *Historie which would have been more valuable if it had been longer.

In English, though we have no investigators of the history of education we have a fairly large literature on the subject, but it belongs almost exclusively to the United States. The great work of Henry Barnard, the *American Journal of Education*, in 25 vols., has valuable papers on almost every part of our subject, many of them translated from the German, but there are also original papers on our old English educational writers and extracts from their works. This is by far the most valuable work in our language on the history of education. The small volumes published in America with the title of *History of Education* do not deserve notice. In England may be mentioned the article on education by Mr James Mill, published in the early editions of the *Encyclopaedia Britannica*, and Mr R. H. Quick's *most excellent Essays on Educational Reforms*, published in 1866. Since then Mr Leitch of Glasgow has issued a volume called *Practical Educationalists*, which deals with English and Scotch reformers, as well as with Comenius and Pestalozzi. Now that professorships of education have been established we may hope for some original research. The first professor appointed was the late Joseph Payne, a name well known to those among us who have studied the theory of education. The professorship was started by the College of Preceptors. At Edinburgh and at St Andrews professors have since been elected by the Bell Trustees.

Valuable reports as to the state of education in the various countries that possess a national system were presented to the English Schools Inquiry Commission in 1867 and 1868, by inspectors specially appointed to investigate the subject. The reports on the Common School System of the United States and Canada are by the Rev. James Fraser, on the Burgh Schools in Scotland by D. R. Fearon, and on Secondary Education in France, Germany, Switzerland and Italy, by Matthew Arnold, published in Parliamentary Papers [1867], 1867, and 1868. A preceding list of some useful books on education generally —


To the district will become insufficient, when the persons who would be the electors if there were a school board (in a borough by council), and (2) when they are satisfied that the managers of an elementary school are unwilling or unable to maintain it, and by its discontinuance the supply of education will be insufficient. The body of the Act describes the constitution, powers, duties, and revenues of school boards, as in the following brief summary:

1. **Constitution** — The school board is a corporation with perpetual succession and common seal, and power to hold land without limit in mortmain. It is elected by the burgesses in a borough, and by
the ratepayers in a parish, each voter having a number of votes equal to the number of vacancies having the right to give any number of such votes to any one candidate, and to distribute them as he pleases. The number of members varies from 6 to 15 as may be necessary. The London school board is elected under special regulations.

2. Powers and Duties — Every school board, for the purpose of providing sufficient public school accommodation, may erect school buildings, purchase, on lease, or otherwise acquire and improve schoolhouses and supply school apparatus &c., and purchase or take on lease any land or any right over land, fisheries, or minerals, for the purpose of erecting school buildings, or of carrying out the provisions of their district. They may provide or improve schoolhouses and supply school apparatus &c., and purchase or take on lease any land or any right over land, fisheries, or minerals, for the purpose of erecting school buildings, or of carrying out the provisions of their district. Sections 52 to 58 enable the board to pay the fees of poor children attending public elementary school other than their own, and Section 56 enables the board to pay the fees of poor children attending a public elementary school, if the parent or guardian refuses to pay the fees. The boards are to be elected by the ratepayer of the district in which they sit. The board may delegate their powers (except that of raising money) to managers. Any breach of these regulations may subject the board to be declared in default by the Education Department, who will then nominate a new board. The fees of children attending school boards are to be fixed by the board, with the consent of the Department, but the board may remit fees on account of poverty for such period not exceeding six months, and it is expressly declared that "such remission shall not be deemed to be partial relief" given to the parent. Further, free schools may be established under which the Education Department is satisfied that the poverty of the inhabitants is such as to render them necessary. Section 25 enables the board to pay the fees of poor children attending a religious elementary school, but "no such payment shall be made or refused on condition of the child attending any public elementary school other than as may be selected by the parent or guardian of the child, and no such payment shall not be deemed to be partial relief." This clause, which exists a vast amount of opposition in Parliament, was repealed by 39 and 40 Vict. c. 59 (see 1876).

3. Revenue of the board is to be paid from a fund called the school fund, constituted primarily by the fees of the children, moneys provided by Parliament, or raised by loan, or received in any other way, and supplemented, if necessary, by the rating authority. In providing buildings, &c., the board may borrow money so as to spread the payment over several years, not exceeding fifty years. (See, as to how, Elementary Education Act 1873, 1876.)

School boards may by a bye-law require the parents of all children between five and thirteen to send them to school, and it is a reasonable excuse, (1) that the child is receiving efficient instruction in some other manner, or (2) is prevented by sickness, or (3) that there is no public elementary school within such distance not exceeding three miles as the bye-laws may prescribe. Breaches of any such bye-law may be recovered in a summary manner, but the penalty shall not exceed five shillings including costs.

Finally, it is provided that in future no parliamentary grant shall be made to any school which does not come within the definition of "public elementary school in the Act of 1870." Such grants shall be made in respect of religious instruction, and shall not exceed in any case the income of the school from other sources. No connexion with a religious denomination is necessary, and no preference is to be given to a school on account of its being or not being a board school. Otherwise the minutes of the Committee of Council govern the proceedings of the grant, such minutes to be one month on the table of both Houses of Parliament before coming into force.

The Elementary Education Act, 1873, amends the Act of 1857 in several particulars not necessary to be specified here.

The Elementary Education Act, 1876, which came into operation on the 1st January, 1877, declares that it shall be the duty of the parent of every child (meaning thereby a child between the ages of five and fourteen) to cause such child to receive efficient elementary instruction in reading, writing, and arithmetic — the duty to be enforced by the orders and penalties specified in the Act. The employment of children under the age of ten, or over that age without a certificate of proficiency or of previous due attendance at a certified efficient school, is prohibited unless the child is attending school in accordance with the Factory Acts, or by permission under the Education Acts. Section 10 substitutes for section 25 of the Act of 1872 the following:

"The parent, not being a pauper, of any child, who is unable by reason of poverty to pay the ordinary fees for such child at a public elementary school, or any part of such fees, may apply to the guardians having jurisdiction in the parish in which he resides, and the parish council shall appoint such guardians or three of them to be guardians for the purposes of this section, to consider, in every case, whether the child shall be admitted to a public elementary school, on the payment of such portion of the fees as shall be determined by them to be practicable, so that the said fees shall be not more than threepence per week, or such part thereof as he or she is, in the opinion of the guardians, so unable to pay."

This payment subjects the parent to no disqualification or disability, and he is entitled to select the school. The following new regulations are made as to the parliamentary grant. A child obtaining before the age of eleven a certificate of proficiency and of due attendance, as in the Act mentioned, may have his school fees for the next three years paid for him by the Education Department — such school fees to be calculated as school-plain. The grant is no longer to be reduced by its excess above the incomes of the school, unless it exceeds 17s. 6d. per child in average attendance, but shall not exceed that amount except by the same sum by which the income of the school, other than the grant, exceeds it. Special grants may be made to places in which the population is small. Other clauses relate to industrial schools, administrative provisions, &c.

Scotland.—Previous to the Education (Scotland) Act of 1872, the public elementary education rested on the old parochial system, supplemented in more recent times by the parliamentary grants from the Committee of Council on Education. Under the old law the heritors in every parish were bound to provide a schoolhouse, and to contribute the schoolmaster's salary half of which, however, was legally chargeable on tenants. The Education Act of 1872 establishes for a limited number of years a Board of Education for Scotland, to be responsible to the Scotch Education Department of the Privy Council, on which its functions are ultimately to devolve. The board makes an annual report to the department.

A school board must be elected in every parish and burgh as defined in the Act. The number of members (between five and fifteen) is fixed by the Board of Education, and no teacher in a public school is eligible. The election is by cumulative vote, and disputed elections are to be settled by the sheriff. The school board is a body corporate. Existing parishes, burgh, and other schools, established under former Acts, are to be handed over to the school board.

The school board, acting under the Board of Education, shall provide a sufficient supply of school accommodation, and in determining what additional amount is necessary, existing efficient schools are to be taken into account, whether public or not. Provision is made for the transfer of existence of existing schools to the school board.

The clauses as to the school fund, and the power of the board to impose rates and to borrow money, are similar to those in the English Acts, and it is declared that sunk funds for the benefit of burgh or parish schools shall be administered by the board, and that the board shall be at liberty to receive any property or funds to be employed in promoting education. Schoolmasters in office at the passing of the Act are not to be prejudiced in any of their rights, but all future appointments shall be during the pleasure of the board, who shall assign such salaries and emoluments as they think fit.

Sections 56—69 relate to the qualifications of teachers. A principal teacher in a public school must possess a certificate of competency or an equivalent as defined in the Act.

Section 62 contains provisions for the maintenance by the school board of higher class public schools in burghs, which are as far as practicable to be released from the necessity of giving elementary instruction, so that the funds may be applied more exclusively to the instruction on the higher branches. And when by reason of an increase of school attendance or otherwise, the parents of a child are to be entitled to give the child a certificate of proficiency in the higher branches, it may be deemed to be a higher class school and maintained accordingly.

The following are the Acts relating to education in Scotland recited in the Education Act of 1872—Act of Scots Parliament, 1868 (1st of King William); 48 Geo. III. c. 54; and 2 Vic. c. 87, and 24 and 25 Vict. c. 107.
Parliamentary grants are to be made (1) to school boards, (2) to the managers of any school which is efficiently contributing to secular education. No grant shall be made in respect of (1) religious instruction, (2) new schools, not being public schools; unless it appears that they are required, regard being had to the religious belief of the parents of the children for whom they are intended, or other special circumstances of the locality. Section 68 is the conscience clause, and it may be mentioned that the preamble of the Act states that it is expedient that managers of public schools should be at liberty to continue the custom of giving instruction in religion to children whose parents do not object, with liberty to parents, without forfeiting any of the other advantages of the schools, to elect that their children should not receive such instruction. Section 69 imposes on parents the duty of providing elementary instruction for children between five and thirteen at the public expense. The parents shall pay to the headmaster a certain sum levied on himself or his family. Defaulters may be prosecuted, and persons receiving children into their houses or workshops shall be deemed to have undertaken the duties of parents with reference to the education of children. A certificate of the child's previous by an inspector protects the parent or employer from proceedings under the Act. Other clauses relate to the non-educational duties imposed by various Acts on schoolmasters (now transferred to registrars), and to the 'Schoolmasters' Wallet's Fund,' to which new masters are not required to contribute.

Ireland—The public elementary school system depends on grants made to the lord-lieutenant, to be expended under the direction of commissioners nominated by the Crown, and named the "Commissioners of National Education." The commissioners were incorporated by this name in 1845, with power to hold land to the yearly value of £40,000. The following statement, taken from the rules and regulations of the commissioners appended to their report for 1873, exhibits the leading points of the system as contrasted with that now established in England and Scotland.

"The object of the system of national education is to afford equal literacy and moral and separate religious instruction to children of all denominations, as far as possible in the same school, upon the fundamental principle that no attempt shall be made to interfere with the peculiar religious tenets of any description of Christian people. It is an earnest wish of Her Majesty's Government and of the commissioners that the clergy and laity of the different religious denominations should co-operate in conducting national schools.

The commissioners grant aid to either to vested schools (i.e., schools vested in themselves, or in local trustees to be maintained by them as national schools) or to non-vested (i.e., private schools), and the grant may be towards payment of salary or supply of books, or, in the case of vested schools, towards providing buildings.

The local government of the national schools is vested in the local patrons or managers thereof, and the local patron is the person who applies in the first instance to place the school in connection with the board, unless otherwise specified. The patron may manage the school by himself or by a deputy. If the school is controlled by a committee or vested in trustees, they are the patrons. A patron may nominate his successor, and in case of death, his legal representative if he was a layman, and his successor in office if he was a clerical patron, will be recognized by the commissioners. The local patrons have the power of appointing and removing teachers, subject to a rule requiring three months' notice to the teacher. Every national school must be visited three times a year by inspectors.

In visited schools, the commissioners do not in general make any conditions as to the use of the building after school hours; but no national school house shall be employed at any time, even temporarily, as the stated place of divine worship of any religious community, and no grant will be made to a school held in a place of worship. In all national schools there must be secular instruction four hours a day upon five days in the week. Religious instruction must be so arranged that each school shall be open to the children of all communions, that due regard be had to parental right and authority, and that accordingly no child shall receive or be present at any religious instruction of which his parents or guardians disapprove. In non-vested schools it is for the patrons and local managers to determine whether any and what religious instruction shall be given. In all national schools, the patrons have the right to permit the Scriptures to be read, and in all vested schools they must afford opportunities for the same, if the parents or guardians require it.

EDWARD, or EADWARD I, king of the Anglo-Saxons, was the eldest son of Alfred the Great, and succeeded his father, by the voice of the Witan, 26th October 901. He was then about thirty years of age, and had already in 893 distinguished himself by inflicting a disastrous defeat on the Danes at Farnham. His election to the throne was disputed by his cousin Ethelwold, who, having himself the Dunes of Northumbra, waged with varying success a civil war of four years' duration. It was brought to a close in 906 by Ethelwold's death in battle, when Edward concluded a peace with the West Anglians and Northumbrians. The pacification was not, however, of a very satisfactory nature, and was not of long continuance, for in 910 Edward "sent out a force of West Saxons and Mercians, who greatly spoiled the army of the north," and in 911 the Dunes, receiving large reinforcements from France, made repeated attacks on Wessex and Mercia. Against this enemy Edward and his sister Ethelfleda, who became "lady of Mercia" in 912, formed conjunct measures. Ethelfleda drove the Dunes from Mercia, and to secure her conquest erected the fortresses of Builgenorth, Stafford, Tamworth, and Warwick, while Edward, by adopting the same methods in East Anglia and Essex, gradually accomplished the complete subjugation of the Dunes. On the death of Ethelfleda in 922 he annexed Mercia to his own crown, and became king of all England south of the Humber. But this was not the whole result of his victories, for the Dunes of Northumbra, the Welsh, the Scots, and the Britons of Strathclyde, either from dread of his power or from desire for his protection, voluntarily chose him to be their "father and lord." He died in 925, inferior to his father in the higher moral and intellectual qualities, but not in common sense superior to his as a legislator and warrior, and under him the Anglo-Saxon rule attained a fame and influence to which it had never before made a near approximation.

EDWARD, or EADWARD II, known as the Martyr, an Anglo-Saxon king, succeeded his father Edgar in 925, at the age of about thirteen years. He was the elder son of Edgar, and is said to have been recommended by him as his successor, but the party in the state opposed to the monks supported nevertheless the claim of his younger brother Ethelred, son of Ealdred, and only seven years of age. The influence of Dunstan was, however, sufficiently great to overbear all opposition, and in a somewhat summary fashion he presented Edward to the Witan at Winchester, and consecrated him king. During his short reign the only circumstances worthy of notice are the quarrels between the two parties in the state, and the rapid decline of the authority of Dunstan and the monks. The death of Edward, which occurred in 978, was the result of a base act of treachery on the part of Ealdred. He was educated at Wareham when he was considered to be of an age for the duties of his office, and was stabbed in the back while partaking of hospitality before her palace gate.

EDWARD, or EADWARD III, king of the Anglo-Saxons, was born at Ips, Oxfordshire, probably in 1004. On the election of Sweyn to the throne of England in 1013, Emma with...
her husband and family took refuge in Normandy; and Edward, notwithstanding the marriage of Emma to Canute in 1017, continued to reside at the Normans' court, until he was recalled to England by Hardecanute in 1041. Hardecanute died in 1042, and "before the king was buried, all folk chose Edward to be king at London;" but partly from his own unwillingness to accept the crown, and partly from his aversion to the position of the Danish king, who came into England with Canute, his coronation did not take place until April 1043. The chief agent in overcoming his scruples, and in quelling all murmurs of opposition against his election, was Godwin the West Saxon earl, whose influence was at that time paramount in England. The exact nature of the relations between Godwin and Edward has been the subject of considerable discussion; but the most probable view of the matter is that, until after the marriage of Edward to Editha, daughter of Godwin, in 1045, these were on the whole cordial and friendly, but that gradually the king's preference of Normans to Anglo-Saxons, has necessary friendship with Lanfrc of Mercia and Siward of Northumbria, and his growing dread of Godwin's ambitious character, led to misunderstanding and distrust. It was, probably, at the instigation of Godwin that Edward, on his accession to the throne, deprived his mother Emma of her possessions, and caused her to live in retirement at Winchester, and that he banished from the kingdom the chief Danish partisans who opposed his election. For the first eight years his reign was comparatively tranquil, the only circumstances worthy of mention being a threatened insurrection between Godwin and the bishops, and a quarrel ensuing, several Normans were slain. The king, on hearing Eustace's account of the affair, without further inquiry commanded Godwin to chastise the town by military execution. Godwin demanded a trial; but the king, incited as it is said by Robert, archbishop of Canterbury, summoned a meeting of the Witan at Gloucester, not for the purpose of inquiring into the affair at Dover, but to pass judgment on Godwin for his conduct. Ultimately, Godwin was sentenced to leave the country and take refuge in Flanders. It was during his absence that William, duke of Normandy, visited England; and if this prince did not then receive the promise of the crown from Edward, his ambition to possess it and his hopes of success were doubtless confirmed by his visit. There seems to have been general regret at Godwin's absence; and encouraged by the assurances he received from England, he gathered a fleet, and uniting with Harold, appeared before London. The king endeavoured to oppose him, but was obliged to yield to the wishes of his subjects, and Godwin and his sons were reinstated in their possessions. When her father left England, Editha had been deprived of her property and sent to the royal abbey of Westminster, and the only wish was to be present at its consecration, which was to take place on the 25th December, but over-exertion on some previous festival days was too much for his remaining strength. His share in the ceremony had to be performed by deputy, and on the 26th December, 1066. It was his last wish that Harold should succeed him on the throne. The virtues of Edward, it has been said, were monastic rather than kingly. His aims were just and righteous, and he showed his interest in his subjects by the preparation of a digest of the laws of the kingdom, and by the repeal of the Danelaw, or war tax; but his weak character and his feeble interest in worldly matters caused the real government of the kingdom during his reign to be placed almost entirely in the hands of favourites. See Palgrave's History of the Anglo-Saxons, Green's History of the English People, and especially Freeman's Norman Conquest, vol. ii.

EDWARD I. (1239-1307), king of England, was the son of Henry III. of England, and of Eleanor, daughter of the count of Provence, and was born at Westminster, June 16, 1239. In 1253 he was named governor of Gascony in room of Simon de Montfort, with whom Henry was dissatisfied; and in 1254, by his marriage with Eleanor, daughter of Alphonso X. of Castile, he secured to the English for a time undisputed possession of that province. At the battle of Lewes, 13th May 1264, Edward, by the impetuosity of his attack, at first defeated the barons with great slaughter, but by his too great rashness in pursuit failed to give the king proper support in another part of the field, and was thus the cause ultimately of the utter rout of the royal forces. He was taken prisoner, but escaping by a clever stratagem, he joined with the earl of Gloucester, and inflicted a disastrous defeat on De Montfort and his sons at Evesham, August 3, 1265. In 1269, at the request of the Pope, he undertook a crusade to the Holy Land. He reached it in 1270, and in 1271 he captured Nazareth and massacred all the Turks found within its walls. In revenge, perhaps, for this act, an assassin, on June 12, 1272, stabbed him in three places with a poisoned arrow; but his vigorous constitution triumphed over his injuries and he completely recovered. In the same year his father died, and he was proclaimed king. He had arrived at Sicily when the news reached him, but instead of going direct to England, he crossed over to Italy, and thence into France, where in a tournament his followers quarrelled with those of the count of Chalon, and he slew the count in single combat. He landed in England August 2, 1274, and was crowned on the 19th. In October of the same year he issued writs to inquire into the state of the realm, and the next year there were passed the laws called the Statutes of Westminster, which reformed many of the abuses of the feudal system, secured freedom from undue influence in the election of sheriffs and other justices, and threatened with penalties certain oppressive acts on the part of the barons. In 1277 he conquered Wales and caused Llewelyn to sue for peace; but in 1280, a Welsh war again broke out, which continued till the death of Llewelyn in 1282. Edward's plan to obtain money for the expenses of this war, by summoning for consultation in 1283 representatives of the shires, the boroughs, and the church, was the germ of the English House of Commons, although the first properly constituted Parliament did not meet till 1295. A less creditable method of raising money was the banishment, in 1280, of the Jews from England, on condition that the clergy and laity submitted to a tax of a fifteenth. Two other important decisions were the consequence of his money difficulties — in 1297 he refused submission to the bull of Boniface VIII. forbidding the clergy to be taxed on their ecclesiastical revenue, and in 1299 he was obliged to confirm the charters conferring on the people the right to fix their own taxation. In 1290 Queen Eleanor died, and in 1293 Edward entered into negotiations for a marriage with Margaret, sister of Philip IV. of France; but on account of an act of treachery on the part of the French, these negotiations were broken off for a time, and the marriage did not take place till 1299. From 1295 the affairs of Scotland occupied his chief attention. In 1292 he had decided the claims of the candidates for the Scottish crown
in favour of Baliol, on condition that the latter acknowledged him as lord paramount, and on the breaking out of war with France he demanded his assistance. On Baliol's refusal, and on learning that he had entered into a treaty with France, Edward in 1296 captured Berwick, defeated the Scots at Dunbar, took the castles of Roxburgh, Jedburgh, Edinburgh, Dumbarton, and Stirling, and, receiving at Perth Baliol's unconditional surrender, sent him prisoner to the Tower. In 1297 Wallace headed a rebellion of the Scots, and defeated the English with great slaughter at the battle of Stirling bridge; but next year the Scots suffered an overwhelming defeat at Falkirk, and only prevented the further success of the English by laying waste their own country. In 1299 and 1300 Edward's attempts at invasion met with little success on account of opposition from his barons. In 1301 he invaded Scotland for the fifth time, but at the request of the king of France granted it a truce. In 1304 he compelled its submission, and exempted from the amnesty granted to the Scotch nobles Sir William Wallace, who was captured and executed in 1305. In 1307, to avenge Bruce's murder of Conyn and his attacks on the English, Edward resolved on a seventh invasion, and, though in great bodily weakness, determined to lead his army in person, but his almost unexampled labours had already undermined his vigorous health, and he died 7th July 1307, at the village of B urgh-the-Sands, on the fifth day of his march northwards from Carlisle. He had given orders that his dead body should be carried before the army until his enemies were conquered, but his son Edward made no endeavour to fulfil his wish. The body was escorted to Waltham, and was buried at Westminster on 27th October. In Edward were united in a rare degree both the physical and mental qualities of a great general; and he is one of the few English kings, and perhaps the first, who can lay claim to the higher qualities of statesmanship. The measures which he passed for the government of his own kingdom, and the concessions he made to the demands of his subjects, almost entitle him to be called the founder of England's constitutional freedom; while the far-seeing wisdom of his foreign policy was shown by his sacrificing his influence in France in order to quell the opposition to his authority in Scotland. The whole tenor of his reign was a continual attempt to secure the attainment of this end, and it is his highest title to memorable remembrance. His hardy manner of attaining his end, and the cruel punishments he exercised on those who sought to thwart his efforts, may be excused partly on account of the times in which he lived, and partly as arising from the just vexation of a stern and eager nature, and they are somewhat counter-balanced by the righteousness and clemency with which he governed Scotland at the periods when it was under his rule.


**EDWARD II.** (1284-1327), king of England, fourth son of Edward I. and of Eleanor, was born at Carnarvon, April 25, 1284, and became heir-apparent in 1285. His first title was earl of Carnarvon, but in 1301 he was created earl of Chester and prince of Wales. His personal character, and the whole tenor and tendency of his reign, may perhaps be best described as the opposite of those of his father. Though not the slave of any of the worst vices, and not without natural abilities, he was weak, indolent, and faithless, and his utter incompetence for the position in which fortune had placed him requires no other proof than the fate which finally overtook him. His first acts after the death of his father foreshadowed his future career. He at once recalled Piers Gaveston, a favourite whom his father had banished from the court, and created him earl of Cornwall, caused his father's body to be buried at Westminster, and, after rejoining the army for a few days, returned again to London, and for six years made no serious effort to prosecute the war with Scotland. Previous to his coronation he went to France to be married to Isabella, daughter of Philip II.; and by appointing Gaveston guardian of the kingdom during his absence, and loading him with honours and presents on his return, he roused the animosity of the nobles to such a height that it was only on his promising to agree to certain demands that might be submitted to him at a future Parliament, that they consented to his coronation. It took place 25th February 1308. Until the nobles rose in rebellion in 1312, and executed Gaveston at Warwick castle, the favourite formed a perpetual subject of disputes between the nobles and the king, and was alternately banished and recalled according to the king's exigencies. In 1311 Parliament confirmed the report of the "Committee of Ordnances" appointed to reform the abuses of the administration. The king nominally agreed to act in accordance with the report, but by a saving clause secured to himself full liberty to evade the principal enactments, the result of which was a series of quarrels with the nobles, becoming more serious each successive time, followed by reconciliations increasing gradually in bolderness till the end of his reign. Robert Bruce took full advantage of the internal difficulties of England, and in 1314 had reconquered the principal strongholds of Scotland with the exception of Stirling castle. For its relief Edward raised an army of 100,000 men, but suffered a runaway defeat at the battle of Bannockburn, 24th June 1314. Edward made no further effort of importance against the Scots till 1319, when he besieged Berwick, which Bruce had taken, but was compelled to raise the siege, and concluded a two years' truce with Scotland. After the death of Piers Gaveston, the place of favourite with the king was occupied by Hugh Despenser. He was banished by Parliament in 1321, but soon returned; and, provoked at this, the barons under Lancaster declared war, but were defeated and Lancaster executed in May 1322. In 1323 a fourteen years' truce was concluded with Scotland. In 1324 Edward was persuaded to send the queen to France in order to settle some disputes with the French king. She succeeded in her mission, but refused to return home, on account, she affirmed, of previous ill-treatment by her husband, although doubtless intrigues with Roger Mortimer had something to do with her refusal. From France she went to Flanders, and, raising a small army against the king, landed at Orwell in Suffolk, 23rd September 1326. The whole nation flocked to her standard, Despenser was executed, and young Edward was appointed guardian of the kingdom. In 1327, the king was formally deposed by Parliament, and his son elected in his stead. A plot was formed against the deposed monarch in the same year, and he was murdered with great cruelty at Berkeley Castle on the 27th September. (See the same writers for this reign as for the last.)

**EDWARD III.** (1312-1377), king of England, eldest son of Edward II. and of Isabella, was born at Windsor, November 13, 1312. He was appointed guardian of the kingdom October 26, 1326, and received the crown February 1, 1327. On the 24th January 1328 he was married to Philippa, daughter of the count of Hainault. During his minority the government of the kingdom was intrusted to a body of guardians with Henry of Lancaster as their head, but was virtually usurped by Roger Mortimer, until the king, irritated by his arrogance, caused him to be
Edward.

seized at Nottingham on the 15th October 1330, and conveyed to the Tower. He was executed at Tyburn on the 29th November. It is said to have been chiefly through Mortimer's influence that, on the 24th April 1326, a peace was concluded between England and Scotland, the chief provisions of which were that the Scots agreed to pay England the sum of £200,000, and that Edward agreed to recognize the independence of the Scotch crown. The treaty was very unpopular in England, and it is not surprising, therefore, that, when Edward Baliol in 1332 made his attempt to mount the Scotch throne, Edward III. gave him indirect assistance, and that after Baliol's destruction in 1333 an invasion of Scotland was resolved on. On July 19 Edward defeated the Scots at the battle of Haldon Hill, and receiving as the result of his victory the submission of the principal Scotch nobles, he annexed the whole of Scotland south of the Forth to his own crown, and allowed Baliol to reign over the remainder as titular king. Soon after, Baliol was again in fugitive, but was again aided by Edward to mount a nominal throne. After a short period of peace Edward in July 1336 ravaged and burned Scotland as far as Aberdeen, but growing complications with France compelled him in the same year to return to England. Though he professed to have a claim, through his mother, on the French throne against Philip of Valois, that claim was left in abeyance until several acts of aggression on the part of Philip brought about a rupture between the two kings. The count of Flanders, as Philip's instigation, had broken off commercial relations with England. French privateers were daily committing ravages on English commerce; Aquitaine was continually threatened by desultory attacks; and Philip, though he hesitated to accept the responsibility of being the first to declare war, scarcely attempted to conceal his intentions to throw that responsibility on Edward. Edward sailed for Flanders July 16, 1338, and at Coblentz endeavoured to seize the Dauphin, but was unsuccessful. In 1346 he set sail on the expedition which resulted in the battle of Sluys, at which the French agreed to pay for King John a ransom of three million crowns, and Edward renounced his title to the throne of France, but retained his full sovereignty over the whole of the ancient duchy of Aquitaine, the counties of Ponthieu and Guines, and the town of Calais. Peace was again broken in 1369 by Charles of France, and when he concluded a truce with England in 1375 all of France that remained in Edward's hands was Boulogne and Bordeaux in the south, and Calais in the north. The last years of Edward's reign form a sad and gloomy close to a career which had had a vigorous and energetic commencement, and had afterwards been rendered illustrious by great achievements. His empire in France was virtually overthrown; the vast expenditure which had had such a fruitless result was sorely burdening his subjects, and awakening increasing discontent; and he himself, through the gradual decay of his mental faculties, had become a mere tool in the hands of Alice Perrers and of ministers whose only aim was their own aggrandizement. In 1367 the "Good Parliament" virtually seized the helm of the state from the hands of the king and as steadily raised an army Alice Perrers to swear never to return to the king's presence, suspended the munsters Latimer and Lyons, protested against the means then adopted for raising taxes, and demanded a vigorous prosecution of the war. The Black Prince was the chief agent in urging these reforms, but his death, in the midst of the Parliament's deliberations, for a time rendered almost abortive the good work he had begun. Edward died 21st June 1377. The splendour of his reign belongs properly rather to the people than to the monarch. Both in his home and foreign relations he showed considerable prudence and sagacity, and he may be allowed the credit of having endeavoured as much as possible to keep on good terms with his subjects; but under him the progress of constitutional reform was due either to his money difficulties or to events entirely beyond his control. Although endowed with high courage and daring, there is no proof that he possessed more than average ability as a general. His expeditions were planned on a scale of great magnificence, but he entered on his campaigns without any definite aim, and his splendid victories were mere isolated achievements, won partly by good fortune, but chiefly by the valor of Welsh and Irish yeomen and the skill of English archers.

See_History of Edward the Third, by W. Longman (1860); Edward III., by Rev. W. Warburton, M.A. (1783); Pearson's England in the Fourteenth Century (1876), and essay on Edward III., by E. A. Freeman (Essays, first series).

EDWARD IV. (1441-1483), king of England, was the second son of Richard duke of York, and was born at Bœu, April 29, 1441. His father was appointed protector of the kingdom during the incapacity of Henry VI., and having in 1460 laid claim to the throne as a descendant of Edward III., was named by Parliament successor of Henry VI. on condition that he allowed Henry to retain his throne. As an heir had been born to the king, it was only natural that Queen Margaret should seek to resist this proposal. She laid claim to the throne against the duke of York, and he was defeated and slain at the battle of Wakefield, December 30, 1460. Edward, who was at that time in Wales, on hearing of his father's death resolved to avenge it, and gathering a mixed army of Welsh and English, defeated the earl of Pembroke and Ormond at Mortimer's Cross in Hereford, February 7, 1461. On February 17, Queen Margaret defeated the Yorkists at St Albans; but Edward, notwithstanding her victory, having united his forces with those under Warwick entered London, and, being received by the citizens with loud shouts of welcome, was proclaimed king 4th March 1461. But he could not permit himself to enjoy his dignities in idle security. King Henry had escaped and joined the army of the queen, which, having withdrawn to the north,
was to the number of about 60,000 encamped at Towton, about eight miles from York. Here Edward and Warwick met the queen's forces, and a battle of great obstinacy ensued, which, notwithstanding the arrival of a reinforcement to Margaret in the middle of the battle, ended in her utter defeat. Henry and Margaret fled to Scotland, and on the 28th June Edward was crowned at London. Margaret afterwards escaped to France, from which country in 1462 she made two separate attempts to retrieve the fallen fortunes of her house, but these, as well as one made by Henry in 1464, proved utterly abortive. In May 1461 Edward was secretly married to Elizabeth, daughter of Richard Woodville, Lord Rivers, and widow of Sir John Gray; and having in the September following publicly acknowledged her as his queen, he grossly disappointed and displeased his chief supporter, the earl of Warwick, who had been negotiating for the marriage of Edward with the sister of Louis XI. of France. Though from this time secretly bending all his energies to accomplish Edward's overthrow, Warwick skilfully concealed not only his intentions but even his share in overt acts; and it was not till 1469 that receiving intelligence of the success of an insurrection secretly fomented by him in Yorkshire, he showed his hand by taking the king prisoner near Coventry. Shortly after, Edward either escaped or was allowed his freedom, and in 1470, he defeated the rebels near Stamford, and compelled Warwick to make his escape to France. Here the earl, through the good offices of Louis, was reconciled with Queen Margaret, and agreed to invade England in behalf of her husband. Landing at Doutmouth, he soon had an army of 60,000 men. Edward, taken by surprise and unable to raise a force sufficient to oppose him, fled to Holland; and Warwick, having released Henry, again got him acknowledged king. Edward in his turn adopted the tactics that had been successful against him. In 1471 he landed at Ravenspur, and professing at first to resign all claims to the throne, and to have no further aim than merely to recover his inheritance as duke of York, he soon collected sympathizers, and then, throwing off all disguises, issued proclamations against Henry and Warwick. He marched without opposition direct to London, and after entering it and taking Henry prisoner, advanced against the army which had been collected to oppose him. The encounter took place at New Barnet, April 14, when the party of Warwick were defeated and Warwick himself was slain. On the same day Margaret with her son Edward, now eighteen years of age, had landed at Weymouth, but on May 4 she was defeated at Towkesbury and taken prisoner. Her son either perished in battle, or was slain shortly after by the order of the king; and her husband Henry died in the Tower on May 21, the evening of the day on which Edward re-entered London. Secure at home, Edward now turned his thoughts on foreign conquest. In 1475 he formed an alliance with Charles of Burgundy against Louis, but on landing on the Continent with a large army he learned that the duke and Louis had come to an understanding, and prudence compelled him to enter into a seven years' treaty with the power he had hoped to conquer. Shortly after this, the duke of Burgundy having died, Clarence, the brother of Edward, wished to marry Mary, the duke's daughter and heiress; but Edward, perhaps on account of chargin at the former defeats of her father, refused his consent to the suit. Exasperated at his brother's conduct, Clarence took no pains to conceal his anger, and Edward thought it proper to impeach him of treason before the House of Lords. He was condemned to death, February 7, 1475, and on February 17 was executed in the Tower, but with so great secrecy that the manner of his death is unknown. Edward died April 9, 1483. The beauty of his person and the freedom of his manners rendered Edward a great favourite with the lower and middle classes, but there appears to have been little in his character to awaken real esteem. He had certainly an ability for subtle scheming and intrigue, but his memory was clouded by a constant agitation with no act conferring any benefit of importance on his country, and it is tarnished by several deeds of ruthless cruelty, and by the helpless self-indulgence into which he sank during his later years. On account of the unsettled nature of the country during his reign, the influence of Parliament on the affairs of the kingdom became virtually suspended, while the antipathy and contents between the two parties of the nobles made it almost a necessity that that party which supported the king should be unable to present any strong resistance against undue exercise of authority on his part. The result was the inauguration of that form of despotism known as the New Monarchy.

EDWARD V. (1470-1483), king of England, was the son of Edward IV. and of Elizabeth, and was born in the sanctuary of Westminster Abbey, November 4, 1470. As soon as Edward IV. was dead his brother Richard, duke of Gloucester (see Richard III.), acting so far in accordance with the late king's wishes, secured possession of the person of the young king, and was appointed by Parliament protector of the realm. He had previously arrested Earl Rivers, the young king's uncle, and Lord Richard Gray his half-brother, and his next step was to accuse Lord Hastings, president of the royal council, of designs on his life, and to have him executed almost immediately afterwards on Tower Green. The way being now cleared for a full declaration of his designs, he caused it to be decided at a meeting of the Lords and Commons that the marriage of Edward IV. had been invalid on account of the existence of a precontract; and, receiving a petition to act in accordance with this decision and assume the crown, he after a very slight reluctance consented to do so. Edward V. and his brother were confined in the Tower. Shortly after it was known that they were dead, but though it was the general conviction that they had been murdered, it was not till twenty years afterwards that the manner of their death was discovered. Brackenbury, the constable of the Tower, had refused to obey the command of Richard to put the young princes to death, but complied with a warrant ordering him to give up the keys of the Tower for one night to Sir James Tyrrel, who had agreed to provide for the accomplishment of the infamous act. He gave admittance to two assassins hired by himself, who smothered the two youths under pillows while they were asleep.

For Edward IV. and V see Great's Short History of the English People, the Houses of Lancaster and York, by James Gardiner, and "Konig Richard III." in Paul's Allgemeine Geschichte der Welt.
legislation in favour of Reforma1tion principles. Though England was in a somewhat unsettled state, this did not prevent him from planning an expedition against Scotland, on account of that power refusing to fulfil a former treaty by which a marriage had been agreed upon between Mary Queen of Scots and Edward. He defeated the Scots at the battle of Pinkie Cleugh, September 10, 1547, and next year captured Haddington; but, on account of the illness which he caught there, he was unable to give further attempts against Scottish independence. His brother, who had been created Lord Seymour of Sudeley and made lord admiral of England, was suspected of being at the head of a plot to overturn his authority, and on account of his eccentricities admitted as much as was sufficient to crimiuate himself, although he refused to answer in regard to the more serious charges. In the House of Lords a bill was framed against him which passed the House of Commons almost unanimously, and, it being assented to by the king shortly afterwards, he was executed on Tower Hill, March 20, 1549. In the following summer the distress consequent on the depreciation of the currency and the wasteful expenditure of the court awakened a general discontent, which in different parts of the kingdom broke out in open insurrection. The protector, instead of repressing the rebellion by vigorous measures, gave con­ siderable concessions to the demands of the populace, his sympathy with whom he openly admitted. By such an avowal he necessarily alienated the nobility, and they yielded, on Tower Hill, January 22, 1552. The king, who, except

Edward preva1led over the strong objections of the judges, and letters patent being drawn out of the succession to the throne on the ground of their illegitimacy, and nominating as his successor Lady Jane Grey, who was married to the duke's eldest son. The arbitrary urgency of Northumberland and the religious obstinacy of Edward prevailed over the strong objections of the judges, and letters patent being drawn out in accordance with the king's wishes, passed under the Great Seal, and were signed by the chief nobles, including, although only after repeated endeavours to alter Edward's determination, Cranmer, archbishop of Canterbury. Edward died July 4, 1553. There were some suspicions that his death had been hastened by Northumberland, but although his malady showed at last some symptoms of poisoning, it is now believed that these were caused by accidental administrations of overdose of mineral medicine. The fact that Edward died makes it impos­sible to form a confident estimate of his character and abilities. The exceptional talent which he manifested in certain respects may have been due largely to the

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only charitable to suppose, partly to the irritation of ill health, and possibly to chagrin arising from the presentiment that the English power in France was now on the wane, was the one blot on his fair fame. It closed upon his military career, for he was compelled to retire in 1837, by the advice of his physicians, to return to England. From this time his constitution was utterly broken, but he lingered on to witness the loss of his duchy to England, and also to originate the measures of the "Good Parliament," although his death prevented their completion. He died at Westminster, 8th June 1876. He was buried at Canterbury Cathedral, where his maled dictus may still be seen.


EDWARDES, SIR HERBERT BENJAMIN (1819-1868), major-general in the East Indian army, one of the noblest names on the roll of the soldier-statesmen of the British Indian empire, was born at Frodsham, in Cheshire, November 12, 1819. The family was of high standing. Sir Herbert's father was Benjamin Edwardes, rector of Frodsham, and his grandfather Sir John Edwardes, baronet, eighth holder of the title, which was conferred on one of his ancestors by Charles I in 1644. After receiving his early education at a private school, he was sent to King's College, London, to complete his studies. Through the influence of his uncle, Sir Henry Edwardes, he was nominated in 1840 to a cadetship in the East India Company; and on his arrival in India, at the beginning of 1841, he was posted as ensign in the First Bengal Fusiliers. He remained with this regiment about five years, and during this period gave proof of that "great capacity for taking pains" which is the characteristic of genius. He mastered the lessons of his profession, obtained a good knowledge of Hindustani, Hindi, and Persia, and attracted the attention of the political and literary ability displayed in a series of letters which appeared in the Delhi Gazette. In November 1845, on the breaking out of the first Sikh war, Edwardes was appointed aide-de-camp to Sir Hugh (afterwards Viscount) Gough, then commander-in-chief in India. On the 15th of the following month he served at the battle of Moodkee, and was severely wounded. He soon recovered sufficiently to resume his duties, and fought by the side of his chief at the decisive battle of Solan (February 10, 1846), which closed the war. He was afterwards appointed aide-de-camp to the commissioners of the Trans-Sutlej Territory; and in January 1847 was named first assistant to Sir Henry Lawrence, the resident at Lahore. Lawrence became the great exemplar of the young hero, who looked up to him with the affectionate reverence of a disciple and a son, and in later years was accustomed to attribute to the influence of this "father of his public life" whatever of great or good he had himself achieved. He took part with Lawrence in the suppression of a religious disturbance at Lahore in the spring of 1846, and soon afterwards assisted him in reducing, by a rapid movement to Jamoom, the conspirator Imamuddin. In the following year a more difficult task was assigned him,—the conduct of an expedition to Bunnoo, a tributary Afghan district, in which the people would not tolerate the presence of a collector, and the revenue had consequently fallen into arrear. By his rare tact and firmnes of purpose, Edwardes succeeding in completely conquering the wild tribes of the valley without firing a shot, a victory which he afterwards looked back upon with more satisfaction than upon other victories which brought him more renown. His fiscal arrangements were such, as to obviate all difficulty of collection for the future. In the spring of 1848, in consequence of the murder of Mr Vaas Aclnew and Lieutenant Anderson at Mooltan, by order of the Dewan Moolraj, and of the raising of the standard of revolt by the latter, Lieutenant Edwardes was authorized to march against him. He set out immediately with a small force, occupied Leen on the left bank of the Indus, was joined by Colonel Cortlandt, and, although he could not attack Mooltan, held the enemy at bay and gave a check at the critical moment to their projects. He won a great victory over a greatly superior Sikh force at Kynyre (June 18), and received in acknowledgment of his services the local rank of major. In the course of the operations which followed near Mooltan, Edwardes lost his right hand, by the explosion of a pistol in his belt. On the arrival of a large force under General Whish the siege of Mooltan was formed, but was suspended for several months in consequence of the desertion of Shere Singh with his army and artillery. Edwardes distinguished himself by the part he took in the final operations, begun in December, which ended with the capture of the city, January 4, 1849. For his services he received the thanks of both houses of parliament, was promoted major by brevet, and created C.B. by special statute of the order. The directors of the East India Company conferred on him a gold medal and a good service pension of £100 per annum. After the conclusion of peace Major Edwardes came to England for the benefit of his health, married during his stay there, and wrote and published his fascinating account of the scenes in which he had been engaged, under the title of A Year on the Punjab Frontier in 1848-1849. His countrymen gave him fitting welcome, and the university of Oxford conferred on him the degree of D.C.L. In 1851 he returned to India and resumed his civil duties in the Punjab under Sir Henry Lawrence. In November 1853, he was entrusted with the responsible post of commissioner of the Feshawur frontier, and thus he held when the Mutiny or Sepoy War of 1857 broke out. It was a position of enormous difficulty, and momentous consequences were involved in the way the crisis might be met. Edwardes rose to the height of the occasion. He saw as if by inspiration the facts and the need, and by the prompt measures which he adopted he rendered a service of incalculable importance, by effecting a reconciliation with Afghanistan, and securing the neutrality of the Amur and the tribes during the war. So effective was his procedure for the safety of the frontier that he was able to raise a large force in the Punjab and send it to cooperate in the siege and capture of Delhi. In 1859 Edwardes once more came to England, his health so greatly impaired by the continual strain of arduous work that it was doubtful whether he could ever return to India. During his stay he was created K.C.B., with the rank of brevet colonel, and the degree of LL.D. was conferred upon him by the university of Cambridge. Early in 1862 he again sailed for India, and was appointed commissioner of Ambala and agent for the Cis-Sutlej states. He had been offered the governorship of the Punjab, but on the ground of failing health had declined it. In February 1866, he was compelled finally to resign his post and return to England. A second good service pension was at once conferred on him; in May 1866, he was created K.C. of the Star of India, and early in 1868 was promoted major-general in the East India army. It was known that he had been for some time engaged on a life of Sir Henry Lawrence, and high expectations were formed of the work, but he did not live to complete it. He died in London, December 23, 1868. Sir Herbert Edwardes was a singularly loyal and devoted public servant, and was generally beloved by his personal friends, and was generous and unselfish to a high degree. He was also a man of deep religious convictions.
and naturally desired and hoped for the evangelization of India. But his zeal was under the restraint of knowledge, and he knew how to reconcile private separation with public duty. When Sir John Lawrence, he advocated toleration for the native religious systems, and at the same time deprecated Government support of them in any way. "India," says a writer in the Pall Mall Gazette, "has produced many great men, some of whom have done more for their country; but there were few upon whom the stamp of genius was more widely impressed than upon Herbert Edwards." The life of Sir Henry Lawrence was completed by Mr Harman Mervale, and was published in 1873.

EDWARDS, BAYRN (1743–1800), the well-known historian of the West Indies, was born at Westbury, in Wilts, on the 21st of May 1743. His father died in 1756, and his education and maintenance were undertaken by his maternal uncle, Zachary Bayly, a wealthy West Indian merchant. He had been placed by his father at the school of a dissenting clergyman in Bath, where he received a careful training in English composition; his uncle's agent, however, removed him to a French boarding school in discovering that he had received no instruction in classics. Edwards went out to Jamaica to join his uncle, in whom he seems to have found everything he could desire,—the most enlightened mind, the sweetest temper, and the most generous disposition. To this was added a truly patriotic regard for himself which was returned with all the warmth of filial affection. His uncle, finding him possessed of literary talents, but deficient in classical acquirements, engaged a Mr Teale, a clergyman and formerly master of a free grammar-school, as resident tutor for him. The relationship proved a very agreeable one to both teacher and pupil, who expressed himself with moderation and affection.

In 1755, however, that he published his great work, on which he had been many years engaged, entitled History, Civil and Commercial, of the British Colonies in the West Indies, 2 vols. 4to. On the question of slavery and the slave trade he naturally took the planter's view, but he expressed himself with moderation and candour. In 1796 he published, in one volume quarto, a History of St Domingo, which had then excited a deep interest, on account of the insurrection of the slaves, and the consequent establishment of an independent negro government. In 1801 a new edition of both these works was published, in three vols 8vo, under the general title of History of the West Indies. A fifth edition issued from the press in the year 1819. When Mungo Park, returned from his celebrated journey in Africa, Edwards, from his oral information, drew up a report of it, which was submitted to the African Society, and published in their Transactions.

In 1766 he took the principal towns in Holland, and two years afterwards travelled in Norway and Sweden. In 1719 he went to Paris for the purpose of studying its natural history collections, and during his stay in France he made two journeys of a hundred miles each, the first to Châlons in Champagne, and the second on foot to Orleans and Blois. On his arrival in England he closely pursued his favourite study of natural history, applying himself to drawing and colouring such animals as fell under his notice. Birds first engaged his particular attention, and having purchased some of the best pictures of them, he made a few drawings of his own, which were admired by the curious, who encouraged the young naturalist by paying a good price for his early labours. In 1731 he made an excursion to Holland and Brabant, where he collected several scarce books and prints, and had an opportunity of examining the original pictures of several great masters, at Antwerp, Brussels, Utrecht, and other cities. In December 1733, by the recommendation of Sir Hans Sloane, the president of the college of physicians, he was chosen librarian to that body, and had apartments assigned him in the college. Here he had the opportunity of a constant recourse to a valuable library filled with scarce and curious books on the subject of natural history, which he so assiduously studied. By degrees he became one of the most eminent ornithologists in his own or any other country. He published the first volume of the History of Birds in 1743, a second volume in 1747, a third in 1750, and a fourth in 1751. In 1758 he continued his labours under a new title, that of Gleanings of Natural History. A second volume of the gleanings was published in 1760, and a third in 1764. The two works contain engravings and descriptions of more than six hundred subjects in natural history not before described or delineated. He likewise added a general index in French and English, which was afterwards perfected with the Linnaean names by Linnaeus himself, who frequently honoured him with his friendship and correspondence. In 1756 he received the gold medal of the Royal Society, given annually on St Andrew's day to the author of any new discovery in art or nature. He was, a few years afterwards, elected fellow of the Royal Society, and of the Society of Antiquaries, London, and also a member of many of the academies of sciences and learning in different parts of Europe. After the publication of his last work, having arrived at his seventieth year, and finding his sight beginning to fail, and his hand losing its wonted steadiness, he retired from public employment to a little house which he had purchased at Plaistow. The conversation of a few select friends, and the perusal of a few select books, were the amusements of the evening of his life; and now and then he made an excursion to some of the principal cities in England, particularly to Bristol, Bath, Exeter, and Norwich. His general health began to fail some years before his death, which took place on the July 23, 1773.
or, Connecticut, October 5, 1703. He was the  

a family of eleven children, of whom four were  

himself. Even in his very early years the religious  

communicated to him by his parents seems to  

god a large share of his interest, and to have  

strong influence on his character. In a state  

religious views in youth, he says, "I had a  

concerns and exercises about my soul from my  

and also, "from my childhood up my mind  

full of objections against the doctrine of God's  

"In his eighth or ninth year he experienced,  

"two remarkable seasons of awakening;" but  

ions against the doctrine of God's sovereignty  

to trouble him more or less until about his 17th  

year," he says, "I seemed to be convinced and  

led to this sovereignty of God, and his just  

eternally disposing of men, according to his  

pleasure, but never could give an account how or  

since I was convinced of it. I least imagined at  

a long time after, that there was any extra  

fluence of God's Spirit in it." Until he entered  

education was conducted by his father, with the  

assistance of his elder sisters. At the age of six  

the study of Latin, and in that language, as well  

and Hebrew, he attained to considerable  

y. In September 1718 he entered Yale College.  

his B.A. degree in 1720, but with a view to prepara-  

the ministry he continued his residence at college  

additional years. In 1718 he read Locke on the  

Understanding, and it was from its perusal that  

passion for abstract thought was first kindled.  

red that it had afforded him "far higher pleasure  

most greedy miser finds when gathering up hand-  

and gold from some newly discovered treasure."  

licensure to preach in 1722, and in August of  

on the invitation of a number of ministers in  

land, he went to preach to the Presbyterians in  

, where he continued eight months. He was in-  

the congregation to continue with them per-  

but on account of doubts as to his future use-  

that particular sphere, he declined their invitation,  

and to his father's house at East Windsor. Here he  

ed his studies in theology and metaphysics till June  

then he was appointed tutor in Yale College. About  

he completed the series of seventy resolutions  

for the ministry, and designed to give his own  

and life." No 11 of these may  

ioned as specially characteristic: "Resolved, when  

of any theorem in divinity to be solved, immediately  

but I can towards solving it, if circumstances do  

. He resigned his tutorship in September 1729,  

aving an invitation from Northampton to become  

and successor to his grandfather, the Rev. Samuel  

d, and in February 1727 he was ordained to that  

In the following July he was married to Sarah,  

of the Rev. James Prenceport, of New Haven. He  

Northampton till June 22, 1750, when, on  

of a dispute that had arisen from an attempt on  

it to prohibit some of the younger members of his  

ation from perusing certain books, which in his  

were obscene, he found himself compelled to resign.  

On learning of his resignation some of his  

in Scotland advised him to settle in that country,  

was also invited to a church in Virginia, but he ac-  
in preference to either invitation the proposals  
to him by the "Society in London for Propagating  

spel in New England," that he should become  

nary to the Houssamuck Indians, who were settled  

bridge, Berkshire Co., Massachusetts. The nature  

work now left him in possession of considerable  

leisure, of which he made use to such advantage that,  

within the six years of his residence at Stockbridge, he  

completed four of his principal treatises, including that on  

the Freedom of the Will, which was published in 1741.  

On account of the fame which this work acquired for him he  

was in 1757 called to succeed President Burr of Princeton  

College, New Jersey. He was installed February 16,  

1758, but was scarcely spared to enter upon the perfor-  

ance of his duties. On account of the prevalence of  

small-pox in the neighbourhood, he submitted to inocu-  

ation and the disease taking an unfavourable turn, he died on  

the 28th March. Edwards says of himself that he possessed  

"a constitution in many respects peculiarly unhappy,  

attended with fixed solidity, vapidity, error, and mueh  

and a low tide of spirits, often occuring a kind of  

childish weakness and scepticism of speech, presence,  

and demeanour." Notwithstanding this unhappy constitu-  

tion, he was throughout life a laborious student, often  

prosecuting, pen in hand, his arduous metaphysical  

researches for thirteen hours daily. As an orator he some-  
times held not only the feelings but the intellects of  

hearing completely under his sway. The extraordinary  

fluence which he thus exercised was not due to any  

personal advantages, for even when his language conveyed  

meaning without ambiguity, it did so not with  

mark of arrangement which is usually one of the  

chief elements of successful oratory, but in a bald, even  

a lumbering and awkward, manner. His eloquence was simply  

intense moral earnestness, expressed in the form of what, in  

more senses than one, might be called "merciless logic."  

His writings present a very remarkable conjunctural  

of apparently contradictory qualities, a conjunction attribut-  
able partly to a peculiar combination of natural mental  

characters, and partly to a habit of soberness which  
rendered him almost completely ignorant of the predominant  
tendencies of contemporary thought, and placed him almost  

beyond the reach of any external influences fitted to aid him  
in freeing himself from the shackles of past systems.  
The outstanding features of his character were undoubtedly  
his sense of reverence and his passion for ratiocination. In  
these respects these two opposite characteristics combined  
produce a harmonious result, namely, to impress him with  
an almost overwhelming conviction of the claims of duty.  
His awe of the Supreme Power was in one aspect of such  

nature as to seem consistent only with the grossest  

upravention, but from the very fact that it was the awe of  

an intellect, within the sphere of logic, so keen and  

penetrating, it was necessarily a moral awe, an awe which  

intensified that sense of duty whose requirements his  

logical faculty revealed with a distinctness which admitted  
of no fallacy or evasion. It was his overwhelming convic-  
tion of duty which gave to his system, theological, moral,  
and metaphysical, what unity it possessed. That unity is,  
however, nothing more than seeming, the positive and  

negative elements are held apart in different spheres; if  
they were brought into contact the necessary result  
would be an utterly destructive explosion. The basis of his  
whole system is the "sovereignty of God;" and of his  
conviction of God's "sovereignty" he tells us that of how  
by what means he arrived at it he could give no account.  
This mysterious and unaccountable conviction he however,  
endeavours to justify by a protracted logical process, with-  
out being at all conscious of any incongruity between means  
and end. This unconsciousness is due to the fact that the  
strength of his original conviction prevented him from dis-  
cerning the real difficulties he had to surmount. We have  

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thus presented to us the spectacle of a mystic endeavoured to
express his belief by a mere process of reasoning, almost mathematical in its cold and definite precision and in its rigour. It is quite possible that his strong pre-
positions would in any case have prevented him from
exposing their true importance the new problems that
were beginning to appear on the horizon of con-
temporary thought, but, so far from having given these
problems the attention necessary in order to understand
them, he was scarcely aware of their existence. The
impulse he received from Locke's essay On the Human
Understanding did not lead him to seek full acquaintance
with the whole circle of the philosophical speculation of his
time,—partly no doubt because his circumstances prevented
him from doing so, but partly also because he had a strong
bias towards the pursuit of solitary trains of thought. In
him, he writes in the Freedom of the Will he confesses having
never read Hobbes; and although he mentions in a
letter having read one of Hume's works, this would appear to
have been subsequent to the publication of the
essay On the Freedom of the Will, and its purport does not
seem to have impressed him with any idea of its author's
exceptional metaphysical ability, for he merely says of it
and of some other books, "I am glad of an opportunity to
read such corrupt books, especially when written by men
of considerable genius, that I may have an idea of the
notions which prevail in our country." He was scarcely
conscious of the presence of the new influence which was
then stirring the stagnant waters of speculation; but
it certainly influenced him unconsciously, and compelled him
to check his vague unrest by more steadfastly clinging to his
old convictions. He succeeded in doing so, but without
the exercise of constant watchfulness, for, apart from any
immediate external influence, his strong and eager logical
faculty seems often as if bent on carrying him beyond the
bounds of traditional opinion, and requires frequently to be
pulled up with a certain measure of abruptness.

The theological system of Edwards emphasized all the sternest
features of Calvinism and revealed them in strong relief. Calvinism
in its original form was founded on extreme statements regarding
"God's sovereignty" and "man's depravity by nature," but the
inferences implied in these statements are set forth by Edwards
in his system as excellent and regressive ideas with a logical
consistency not previously attempted. The
argument he employs to establish his propositions is unanswerable as
a mere argument of logic, but he shows conclusively that their
truth is, if anything, rather worse than his own; but
when he seeks to go beyond this very circumscribed sphere he
falls into a lattice of self-contradictory assumptions, and
often abstrings a thing that seems to present itself is only a choice of two evils,—either
to remain for ever utterly bewildered by the contradictory paths which open up before him, or by selecting one of them to wander irresolu-
tively beyond the bounds of what he recognizes as orthodox. We
have an example of this when he endeavours to prove that
though men are born utterly depraved, God is not the author of
depraity. His theory is that Adam was originally possessed of
two principles,—one which may be called natural, being the
"primary principles of human nature," or as it is called in Scripture the
"flesh," and another called the supernatural principle, or as in Scripture
the "divine nature." When Adam ate of the tree of forbidden
fruit the divine nature was withdrawn from him, and thus his nature
became corrupt without God infusing any evil thing into it. "So," says Edwards, "does the nature of his posterity; they come into the world
with the flesh, and entire only in the image of natural and inferior
principles." Here it will be seen, not only that Edwards appears to
very little advantage as a reasoner, but that he is in
imminent peril of overthrowing the central positions of his own
system; for, first, if to represent an as a merely negative quality
in any degree solves the difficulty of God being sinless, it does so at
the expense of denying to it a real existence; and, secondly, to
represent man as born into the world "with flesh" entirely destroys
the distinction, so essential to the system, between "natural
and supernatural" principles. He soon, however, escapes back to his old
position although not by the way he set out. "If any," he says,
"should object that this is an essential difference of original righteousness be
considered as an established course of nature, then who
the principles of holiness, when restored by divine grace, also com-
nounced to posteriority, I answer, the divine law and establishment of
the Author of nature are precisely settled by Him as wise and
limited by His wisdom." The moral theory of Edwards is but a corollary from his
theological system. Virtue he places in love or benevolence in
being in general, or more specifically in a "disposition to benevolence
towards being in general," for he does not mean to affirm
that every virtuous act must have unceasing universal existence
as its immediate object," but merely that: "Such a disposition towards
ew objects or beings is of the nature of true virtue, but such
can rise from a generally "benevolent temperament." This love
cannot be primarily a "love of complacency," that is, a
having any regard to excellence in the object, for that "would
beget in a circle, and the same as saying that virtue consists
in love to virtue," and that it cannot consist in "gratitude, or
being benevolent to another for his benevolence to him," be
"thus implies the same "inconstancy," consequent to the
first object of a virtuous benevolence is being simply con-
and, if being simply considered, then being in general.
However, "second object of a virtuous propensity is that
benevolent being, for one that loves being in general will
have good-will to being in general. True virtue must, if
chiefly consist in love to God, for "he that has true love
existing in benevolence to being in general, and in benevo-
lent being, must necessarily have a supreme love to God
of benevolence and complacency. This theory he applies to
the theological dogmas that no one whose virtuous acts are
result of real conscious love to a personal God can possess a
righteousness, or he be in any other moral
utter depravity. As to the merits of the theory itself, it
is not helped by the form in which it is stated. Being in
benevolence without any act of love to a supreme
cause of love. The feeling which Edwards refers to
love, but save or reverence, and, moreover, necessarily a
bliss Properly stated, therefore, true virtue, according to him, is
just as a blind awe of being in general, and a love of compa-
to those who possess a blind awe of being in general—or
would be inconsistent with his definition of virtue as exist
God. In reality, as he makes virtue merely the second of
his love, his theory becomes identical with that of Leibniz, which
the names of Hume, Bentham, and Mill are closely
related, but it is similarly not necessarily expressed in a very awkward
because these are hampered by its derivation from certain theo-
principles, and its necessary connection with a theological be
Unlike Hume and Mill, he deduces his theory primarily from cer-
scolastic propositions regarding God's purpose in the creation
the world." He accepts the Scripture statement that God
himself as his own chief end, and he endeavours by scholastic resa-
looking to show the "reasonableness" of his doing so. He is, however,
unable to proceed a step in his argument without committing his
self to such pantheistic statements as that "God's existence, but
infinite, must be equivalent to universal existence," and that "the
inner and outer infinite are in reality identical," which
would imply universal existence. He is, therefore, obliged to con-
fess that "there is a degree of indistinctness and obscurity in the close
consideration of such subjects that I am at times inclined to fall back
against a principle of benevolent complacency," and,
that "this Implies the most perfect knowledge in these matters," although affirmative at the
same time that, in his endeavours "to discover what the voice of reason
is so far as it can go," he was successful in upholding an "elucidating"
meant by many.

The fame of Edwards is associated chiefly with his treatise On
the Freedom of the Will. His system is defined by which the "mind chooses anything" by "determining the
will," he means "causing that the act of the will or choice about
be thus and not otherwise." And, "with respect to the inquiry
What determines the will," he answers, "It is that motive
which as it stands in the view of the mind is the strongest." Leibniz
according to him, belongs not as the will itself, but to the per
and the liberty which any one possesses is merely liberty to act as
wills. Any other kind of liberty, he affirms, implies these sup-
positions:—(1) "a self-determining power in the will," (2) "indif-
ence,—that previous to the act of volition the mind is in a state
equilibrium;" and (3) "Contingence,—that events are not necessarily
connected with their causes. This supposition, an "revolution
of different forms denies the law of causality, are severally set:
be absurd. That Edwards demonstrates the position of
opponents to be utterly unwarranted is not left quite unam-
mitted; but he is unequally consistently overcome by his own theological position. Accordingly Erv
of the will, like Locke and Hume, is now held out, and those
who, in regard to the supreme power, are antagonists to
Edwards, theory differs in no respect from that of John Stuart Mill, et
that his statement of the doctrine of free will is a little confused that he gives a different account of the origin of our
knowledge of causality. He so far anticipated Hume as to recognize
the cause is often meant "an event coincident with which a cause
or event is so connected that it truly belongs to the reason wi
number of the authors shorter pieces are preserved in the
Paradise of Dainty Dames, first published in 1575, and
reprinted in the British Bibliographer, vol. ii.; the best
known are the lines on May, the Amantium Ira, and the
Commedation of Munc, which has the honour of furnishing
a stanza to Romeo and Juliet. The History of
Damosel and Disdaigne, ascribed to him in the third
edition of the Paradise. In his own day Edwards was
held in the highest estimation. "He united," says Warton,
"all those arts and accomplishments which minister to
popular pleasantry; he was the first fiddler, the most
fashionable somnambulist, the readiest rhymer, and the most
facetious mimic of the court."

See, besides the numerous authorities given by Allhame in
Dott. of Brit and Aner Authors, the Shakespeare Soc. Papers, vol. n.
aed., Worn, English Dram. Literature, vol i.

EDWIN, or Edwine, king of Northumbria, was the
son of Eulla, king of Deira, and was born about 586. At
the death of Eulla, in 588, Ethelfred, king of Bernicia,
Eulla's brother-in-law, usurped the throne of Deira, and
united the two kingdoms Deira and Bernicia, under the
name of Northumbria. Edwin ultimately found shelter
with Rædwald of East Anglia, who let him, defeated and
slew Ethelfred near the river Idle, and enabled Edwin to
mount the Northumbrian throne. In 625 Edwin married
Ethelburga, daughter of Edbert, king of Kent. She had
been converted to Christianity, and, at her desire, Paulinus,
a Christian missionary, was allowed to enter Northumbria.
Not long after Paulinus's arrival, Eumer, an envoy of the
king of Wessex, made an attempt to assassinate Edwin, who
was only saved by Lulia, one of his thanes, throwing himself
between him and the assassin's weapon. The thane
was killed, and the sword passing through his body inflicted
also a dangerous wound on the king. The queen about the
same time was seized by the pangs of childbirth, and was
so alarmed on account of what had happened that she
and her infant were for a time in imminent danger.
Paulinus offered up prayers for their recovery, and Edwin
was so much impressed by the seeming answer to the
petition, that, though he did not at once adopt the Christian
faith, he permitted the infant and twelve of his household
to be baptized. He also declared to Paulinus that if he
should succeed in overthrowing the West Saxons, against
whom he had determined to make war, he would himself
become a Christian, and receive the rite of baptism. After
his victorious return he renounced his heathen gods, but
it required all Paulinus's powers of persuasion to get him
finally to adopt Christianity, and to give it his sanction as
the religion of Northumbria. Ultimately, however, he
convened a council of his nobles to ask their advice, and
when they unanimously declared for the new religion,
Cuth, the high priest, at once offered to destroy all the
heathen places of worship throughout the land. This
was done, and in 628 the Northumbrians flocked in crowds
to be baptized by Paulinus. While the introduction of
Christianity into Northumbria is the circumstance most
worthy of mention in Edwin's reign, it was also remarkable
in other respects. So strict was his administration of
justice, that it was said that "a woman with her babe
might walk scatheless from sea to sea in Edwin's day."
He was also the first real Bretwalda, although Eulla, his
father, first laid claim to the title. He compelled the
submission of the West Saxons, conquered Anglesea and
Man by his feet, and received tribute from all the king-
doms south of the Humber, with the exception of Kent.
To guard his northern dominion he erected the fortress of
Edinburgh or Ethelburg's. In 633 Penda, king of
Mercia, taking advantage of a reaction that was setting
in in favour of the old paganism, determined to resist Edwin's
authority and combining with Cadwallader, king of the
Western Britons, defeated and slew him at the battle of
Hestfield.

See Palgrave's History of the Anglo-Saxons, and Green's Short
History of the English People.

Edwy, Edwige, or Edwin, surnamed the Fair, an
Anglo-Saxon king, was the son of Edmund I., and suc-
cceeded his uncle, Edred, on the throne in 955, being then
from 16 to 18 years of age. With the following
Edwy, his younger brother Edgar reigning over
Mercia with the title of sub-king. On account of the re-
lation in which Edwy stood to Dunstan, abbot of Glaston-
bury, enraged at the affront thus put upon the church,
he more faithfully reproduced Rembrandt's peculiarities.

EECKHOUT, GERBRAND VAN DEN

Edwy died in 958.

EEL, a name applied more or less generally to all
species of Murwina, a family of soft-finned apodal fi
but more specially applicable to the species belonging
the sub-family Anguilina. The body throughout
the family of eels is greatly elongated and of snake-like fi
The ventral fins arewanting in all the species, while in
certain forms, as the Murena, the pectoral fins are ab-
sent. The skin is thick and soft, and is c
covered with a glutinous secretion which gives the eel
innumerable slipperiness. It is also sufficiently tough to en-
the skin as not to be apparent, while in such forms
the eel they are altogether wanting. The branchi-
openings are small, and lead into a sac, from which an-
deep is given off. The gills are thus exposed but slight-
ably to the drying influence of the atmosphere, and it is
rst to this, and to the slimy condition of the skin, that
e can exist for a considerable time out of water. Ac-
Dr Gunther, the Murewina comprise 26 genera and 23
species, inhabiting the seas and fresh waters of temper-
and tropical regions. Of these only the true eel, Anguilla,
habit fresh water, although most of the latter are likewise
marine.

Although abounding in almost every river, lake, and
estuary in Europe, little was known until recently of the
life-history of the fresh-water eels. With regard to the
origin Aristotle believed that they sprang from the mud
of the rivers, and in harbours where the water is
brackish. To reach these spawning grounds, eels migrate in
the autumn down the river channels, and at those times they
E E L

en in large numbers by various devices, such as the
ack" of the Thames, a wooden framework support-
baskets, the mouths of which are opposed to the
and which are so constructed that the fish when
nailed is unable to extricate itself. When there are
dles in the way of their getting to the sea, eels are known
pott their spawn in the beds of fresh-water streams,
t is still doubtful whether this may not also occur in
where the sea is quite accessible. Eels are peculiarly
ne to cold, and the fact that the temperature of the
flash waters of estuaries is always higher than that of
ixed salt or fresh water is an additional reason for
seaward migration on the approach of winter. In
erning this journey the darkest nights are chosen, the
ight being sufficient to stay their progress. During
old of winter they lose their appetite and become
ld, large numbers of them congregating together for the
of the additional warmth thus obtained, and burying
elves to a depth of 12 to 16 inches in places where
ceeding tide leaves them dry. In such places they
taken in large numbers by means of eel-spears. In
ershire, according to Yarrell, "the people know how
and the holes in the banks of the rivers in which eels
laid up, by the hour frost not lying over them as it
 elsewhere, and dig them out in heaps." In sprung, the
ation of the young eels up the rivers takes place, the
nts, according to some observers, performing a similar
ney. This migration takes place from February to May,
to the temperature, and some idea of the vast
umbers of young eels which annually pass up our rivers
y be formed from the fact that 1800 of them, each
out 3 inches long, have been observed to pass a given
int on the Thames in a single minute. This monster
asion of elvers, as these young eels are called, is known
the Thames as edelwars, and usually takes place about
beginning of May; and at these times, unfortunately,
ay be often caught in countless numbers in sieves,
special on the Severn, cartloads of them being sometimes
en for sale in the Exeter market. This upward migration,
ike that of autumn, is performed entirely by day, and
 it is carried through in spite of obstacles apparently
unapproachable to a fish. Eels have been known to
ade in steep ascents, 20 feet above the water, showing great skill
and ingenuity in availing themselves of whatever natural
ads the locality might afford. Couch tells of a remark-
able case in the neighbourhood of Inrato1, where the elvers
assed from one stream to another by means of a tree
ich stood between, and the branches of which dipped
nto the water of the lower. Ascending by these, the eels
dropped from the branches on the opposite side into the
upper stream. In some parts of Ireland the fishermen place
haybands on the rocky parts of the river-courses, in order
to facilitate the upward progress of the eels. The most
effectual obstacle, however, to their advance in either direc-
tion is found in a muddy or polluted state of the water, and
old eels, to get rid of such noisome conditions, have
been known to leave the water and travel for considerable
distances in search of purer surroundings. When confined
also in ponds they often show their migratory instinct by
leaving these in the night time, and attempting to make
their way to the nearest river or to the sea.

Like most animals that pass the winter in a torpid
condition, eels are exceedingly voracious during the summer
months, occasionally eating vegetables, but generally
preferring such animal food as young fishes, worms, and
the larvae of insects; they have also been known to devour
much larger creatures, as water-hens, rats, and snakes. Although their food is thus very various, it is essential that
it be fresh, eels at once rejecting whatever their keen sense
of smell detected. Eels were held in great esteem
by the Greeks and Romans, and enormous prices were
sometimes paid for them; by the Egyptians, on the other
hand, they were held in abhorrence. Their snake-like
appearance has had much to do with the prejudice enter-
ained by many people against eels, and to this may be
attributed the fact that in Scotland this valuable fish is
almost wholly rejected as an article of food. Their value
in this respect has, however, been recognized in England
from very early times, the taste for eels having probably
been acquired during the Roman occupation. The Vener-
able Bole states that England in his time was famous for
its salmon and eel fisheries, and Elly is said to have got its
name from the abundance of the eels in that fenny neigh-
bourhood. Eels are very largely consumed in London, the
greater proportion of these, numbering about 10 millions,
being brought alive annually from Holland in welled boats.
The greatest eel-breeding establishment in the world is that
at Comacchio on the Adriatic, where an immense swamp,
bounded and fed by two of the mouths of the river Po, 140
miles in circumference, has been utilized for this purpose.
The industry is very ancient, having yielded in the 16th
century an annual revenue to the Roman Pontiffs, in
whose territory it was, of £12,000. The eels are cooked
at Comacchio, and forwarded to the principal towns of
Italy.

The best known and most widely distributed fresh-water
species is the Sharp-nosed Eel (Anguilla vulgaris). It
occurs, according to Dr Gunther, in Europe to 64° 30' N.
at, in the Mediterranean region, and in North America,
but neither in the Danube, nor in the Black and Caspian
Seas. Like all other eels, it is a very slow-growing fish, but
attains a large size, measuring sometimes 5 feet in length, and weighing in such cases from 20 to 30 lb.
Few eels, however, weigh more than 6 lb. They are
believed to be long lived, one authentic instance being
known of an eel which was at least 31 years old. The
colour of the species is generally dark olive-green on the
upper surface, becoming lighter on the sides, and white
beneath; but the colour depends somewhat on the nature of the stream it inhabits, those obtained in pure water
being known as silver eels from the lightness of their colour, while those found in muddy rivers are darker.

The Conger (Conger vulgaris) is the only British species of
sea-eel. It differs from the true eels in having the upper
jaw projecting beyond the lower, and in the entire
absence of scales. It is abundant in all parts of the
British coasts, especially on rocky ground, and attains a
length of 10 feet, weighing in large examples over 100 lb.
The conger is exceedingly voracious, feeding on other
fishes, and not sparing even its own kind. Its jaws are
strong and well armed, and the capture of a large specimen
is not unattended with danger to the fisherman. Its tail
is exceedingly sensitive and prehensile, the conger being
able with this organ to grasp the gunwales of the boat,
and by a sudden contraction of the muscles to throw itself
overboard, a smart blow on the kail, however, is sufficient
to prevent the possibility of this occurrence. The conger
is peculiarly sensitive to cold, and during severe frosts it is
often taken floating helplessly on the surface of the sea.
Mr F. Buckland states that in 1855 thousands of congrers
were found floating upon the water; they could progress
readily in any direction on the surface, but could not
descend, and consequently fell an easy prey to the boat-
men. In this way, no less than 80 tons were captured.

"The action of the frost," he says, "caused the air in their
swimming bladders to expand so much that the ordinary
muscles could not expel it at will." The chief eel fisheries are on the south and west coasts of England, but
these are not nearly so productive now as they formerly
were. The flesh is not held in much esteem.
The Electric Eel (Gymnotus electricus) belongs to a different family of apodal fishes (Gymnotidae). In its bony, dentate, and oval fin is entirely wanting, and the anal fin is a long, forming a fringe from the throat to the extremity of the tail. It attains a length of 5 or 6 feet, and frequents the marshes of Brazil and the Guianas, where it is provided with terrific electrical organs by means of which it is a provided, and which extends along each side of the lower portion of the tail. When this natural battery is discharged in a favourable position, it is sufficiently powerful to kill the largest animal; and, according to the classic works of the time, to change the line of certain roads, owing to the number of horses that were annually killed in passing through the pools frequented by the gymnoti. These eels are eaten by the Indians, who, before attempting to capture them, seek to exhaust their electrical power by driving horses into the pools. By repeated discharges upon these, they gradually expend this marvellous force; after which, being defenceless, they become timid, and approach the edge for shelter, when they fall an easy prey to the harpoon of the Indian. It is only after long rest and abundance of food, that this fish is able to resume the use of its suble weapon. (v. c.)

Most of the monumental effigies of England, i.e., the effigies of deceased persons, became common in the eleventh century the idea appears, for the first time, to have been carried into effect that the figure of a deceased personage should be represented by effigy upon his monumental memorial. These earliest attempts at commemorative portraiture were executed in low relief upon coffin-lids of stone or purbeck marble, some portions of the designs for the most part being executed by means of incised lines, cut upon the raised figure. Gradually, with the increased size and the greater architectural dignity of monumental structures, effigies attained to a high rank as works of art; and, about the same period, similar figures also began to be engraved, either upon monumental slabs of stone or marble, or upon plates of metal, which were affixed to the surfaces of slabs that were laid in the pavement of churches. Engraved plates of this class, known as "Brasses," continued in favour until the era of the Reformation, and in our own times their use has been revived. It seems probable that the introduction and the prevalence of flat monumental memorials, in place of commemorative effigies in relief, were due, in the first instance, to the inconvenience and obstruction resulting from the increasing numbers of raised stones on the pavement of churches; whereas the comparatively small cost of engraving plates, their high artistic capabilities, and their durability combined to secure for them the popularity they unquestionably enjoyed. It will be kept in remembrance that, if considerably less numerous than contemporary incised slabs and engraven brasses, effigies sculptured in relief, and with some exceptions in full relief, continued for centuries to constitute the most important features in more than a few medieval monuments. In the 13th century, it must be added, their origin being apparently derived from the engravings or sculptures in mosaic cups, their ancient and disappearing result in the formation of a just estimate of their true character and their consequent worth in their capacity as authors of face-portraiture. In the original contract for the construction of the monument at Warwick to Richard Beauchamp, the fifth earl, who died in the year 1449, it is provided that an effigy of the deceased noble should be executed in gilt bronze, with all possible care, by the most skilful and experienced artists of the time; and the details of the ornament and the ornaments of the figure are specified with minute particularity and precision. It is remarkable, however, that the effigy itself is described only in general and decidedly indefinite terms—"an image of a man armed." There is no provision that the effigy should ever be "an image" of the earl; and much less is there a single word said as to its being such a "counterfeit representation" of the features and person of the living man, as the contemporaries of Shakespeare had learned to expect in what they would accept as true portraiture. The effigy, almost as perfect as when it left the sculptor's hands, still bears witness, as well to the conscientious care with which the conditions of the contract were fulfilled, as to the eminent ability of the artists employed. So complete is the representation of the armour, that this effigy might be considered actually to have been equipped in the earl's own favourite suit of the finest Milan steel. The cast of the figure also evidently was studied from what the earl had been when in life, and the countenance is sufficiently marked and endowed with the unmistakable attributs of personal character. Possibly such a resemblance may have been the highest aim in the image-making of the period, somewhat before the middle of the 16th century. Three-quarters of a century later, a decided step further in advance towards the requirement of fidelity in true portraiture is shown to have been taken, when, in his will (1519 A.D.), Henry VII. spoke of the effigies of himself and of his late queen, Elizabeth of York, to be executed for their monument, as "an image of our figure and another of her." The existing effigies in the Beauchamp chapel and in Henry VII.'s chapel, with the passages just quoted.
will of the Tudor king and from the contract by the executors of the Lancasterian earl, with
some difficulty illustrate the gradual development of this idea of true personal portraiture in monumental effigies, during the course of the 15th and at the con-
venient of the 16th century in England. A glance at the naturally first rests on the royal effigies still
used in this country, which commence in Gloucester Cathedral with King John. This earliest example of a
set of effigies of which the historical value has never been duly appreciated is rude as a work of art, and
there is on it the impress of such individuality as illustrates that the sculptor did his best to represent the
Singularity as achievements of the art of the
Ege, the effigies of Henry III., Queen Mairnmore of
and her ill-fated son Edward II., the two former in
Salisbury Cathedral, the last in Gloucester Cathedral; and
here fidelity also as portraits no doubt can be entertained.
In the manner, the effigies of Edward III. and his queen
is, and those of their grandson Richard II. and his
consort, Anne of Bohemia (all at Westminster), and of
her other grandson, the Lancasterian Henry, whose
father might have made his better right to Richard's throne, if
his second consort, Joan of Navarre, at Canterbury—
all speak for themselves that they are true portraits.
Next follow the effigies of Henry VII. and Elizabeth of
York, to be succeeded, and the royal series to be completed,
by the effigies of Queen Elizabeth and the hapless Mary
Stuart, all of them in Westminster Abbey. Very instruc-
tive would be a close comparison between the two last-
known works and the painted portraits of the rival queens,
specially in the case of Mary, whose pictures differ so
remarkably from one another.
As the 15th century advanced, the rank of the personage
represented and the character of the art that distinguishes
an effigy will go far to determine its portrait qualities.
Still later, when more exact face-portraiture had become a
recognized element, sculptors must be supposed to have
aimed at the production of such similitude as their art
would enable them to give to their works; and accordingly,
when we compare effigies with painted portraits of the same
personages, we find that they corroborate one another. The
prevalence of portraiture in the effigies of the 15th and
17th centuries, when their art generally underwent a
rapid decline, by no means raises all works of this class,
or indeed the majority of them, to the dignity of true
portraits; on the contrary, in these effigies, as in those of
earlier periods, it is the character of the art in each partic-
sular case that will go far to determine its merit, value,
and authority as a portrait. In judging of these
latter effigies, however, they must be estimated by the
standard of art of their own era; and, as a general rule, the
effigies that are the best as works of art in their own
class are the best as, and the most faithful in their
portraiture. The earlier effigies, evidently produced in the
great majority of instances without any express aim at
exact portraiture, as we now employ that expression, have
nevertheless strong claims upon our veneration. Often
their sculpture is very noble; and, even when they are
ruined works of art, they rarely fail to be a rough
granodur about them, as exhibited in the fine bold figure
of Fair Rosamond's son, Earl William of the Long Sword,
which repose in such dignified serenity in his own
and occasioned cathedral at Salisbury. These effigies may not bring us
closely to face with the more remote generations of
our ancestors, but they do place before us true images of
what the men and women of those generations were.
Observant students of monumental effigies assuredly
will not fail to appreciate the singular felicity with which the
medieval sculptors adjusted their compositions to the
recumbent position in which their "images" necessarily
had to be placed. Equally worthy of regard is the manner
in which not a few monumental effigies, and particularly
those of comparatively early date, are found to have
assumed an aspect neither living nor lifeless, and yet impres-
sively lifelike. The sound judgment of the sculptor was
probably exercised in their exclusion, almost without an exception, the
more extravagant fashions in the costume of their era from
their monumental sculpture, and introducing only the
simpler but not less characteristic styles of dress and
appointments. In all representations of monumental effigies,
it must be kept in remembrance that they represent recumbent figures, and that the accessories of the effigies
themselves have been adjusted to that position. With rare
exceptions, when they appear resting on one side, these
effigies lie on their backs, and as a general rule (except in
the case of episocal figures represented in the act of
benediction, or of princes and warriors who sometimes hold
a sceptre or a sword) their hands are uplifted and composed
as in supplication. The crossed-legged attitude of numer-
ous armed effigies of the era of mail-armour has been
suspended to imply the personages so represented to have been
crusaders or Knights of the Temple; but in either case the
supposition is unfounded, and inconsistent with unquestionable facts. Much beautiful feeling is conveyed by figures
of many armed angels being introduced as in the act of sup-
porting and smoothing the pillows or cushions that are
placed, in very many instances to give support to the heads of
the recumbent effigies. The animals at the feet of these
effigies, which frequently have an heraldic significance,
enabled the sculptors, with equal propriety and effectiveness,
to overcome one of the special difficulties inseparable from
the recumbent position. In conclusion, it remains only to
remark upon the masterly treatment of outline composition
which so honourably distinguishes the earlier examples of
the engraved effigies in monumental brasses.

Egbert, or Egberht, king of the West Saxons, was
born about 775, and laid claim to the throne in 786, but
Brihtwic was elected, and he was compelled to take refuge
with Offa, king of Mercia. Although Offa refused to
surrender him when requested by Brihtwic, he declined to
honor further protection. Egbert thereupon fled to
France, and took up his residence at the court of
Charlemagne; and it is doubtless to the training he
received from that great general and statesman that the
success of his reign in Wessex is in a large measure to be
traced. When Brihtwic was poisoned by his queen
Edburga in 800, Egbert was recalled and ascended the
West Saxon throne. From his reign may be dated the
supremacy of the West Saxon kings in England. In 823
he defeated Beornwulf, king of Mercia, at Elendun
(near Wilton); and in the same year he united Kent, Essex,
and Sussex to his crown, and compelled East Anglia
to acknowledge him as its over-lord. In 827 he compelled
the submission of Mercia, and leading an army into
Northumbria received its submission without trial of
battle. In 828 he conquered Wales, and thus the isle of
Britain, with the exception of the Picts, the Scots, and the
Strathclyde Welsh, acknowledged a West Saxon king as its
over-lord. During the last period of his reign his kingdom
was subjected to repeated attacks by the Danes. In 832
they ravaged Shropshire, and in 833 defeated Egbert at Cudham
(thought by some to be Charming, in Devon), but in 835
he gained a great victory over a united force of Danes and
Wclsh at Hengestdunesh in Cornwall. He died in 836.

Ege, Hans (1656-1758), the first missionary of
Greenland, was born in the workshop of Sebastian
on the 31st January 1656. In his 22d year he became
pastor at Waagen, in the bishopric of Drontheim, but the
study of the chronicles of the northmen having awakened in him the desire to visit the colony of northmen in Greenland, and to convert them to Christianity, he resigned his charge in 1717; and having, after great difficulty, obtained the sanction and help of the Danish Government to his enterprise, he set sail with three ships from Bergen on the 3d May 1721, accompanied by his wife and children. He landed on the west coast of Greenland on the 3d July, but found to his dismay that the northmen were entirely landed on the west land in establishing superseded interest, and endure for some years great gradual in converting many of them to Christanity, and he soon gained the made. He published a Greenland-Danish-Latin Dictionary (1750), Greenland Grammar (1760), and Greenland Catechism (1766). In 1766 he completed the translation, begun by his father, of the New Testament into the American; in 1787 he translated Thomas Kempis. In 1789 he translated Thomas a Kempis. In 1789 he published a journal of his life in Greenland.

EGER, the chief town of a circle in the kingdom of Bohemia, is situated on the river Eger, and lies at the foot of one of the spurs of the Fichtelgebirge. It possesses an upper gymnasion and a real-school. In the townhouse, which at that time was the burgomaster's house, Wallenstein was murdered, 28th February 1634. His sword and writing table are exhibited in the town. Among the industries of Eger are the manufacture of cloth of various sorts, hats, and shoes. Population in 1869, 13,390.

In 1778, he in the 12th century, the Egermap was formed as an oiled possession of the counts of Vohburg; but they were added to the imperial dominions on the marriage of Adelheid of Vohburg with Frederick I. After being repeatedly transferred from the one power to the other, according to the preponderance of Bohemia or the empire, the town and territory were finally incorporated with Bohemia in 1850, after the Bohemian king became the emperor Charles IV. Several imperial privileges, however, continued to be enjoyed by the town till 1849. It suffered severely during the Thirty Years' War, during the Swedish invasion in 1631 and 1647, and in the War of the Austrian Succession in 1742. (See Graber, Das Königreich auf Eger, 1865; Dvorak, Aulere Geschichte der tschechischen Eger und des bischöflichen Egerland, 1874.)

EGG, the name given to the body formed in the female reproductive organs, which, when impregnated by the male element, gives origin to the young of animals. Although differing widely among themselves in form and structure, the eggs of all animals are found to consist of the same essential parts, viz., the germ cell, the yolk, and the yolk membrane. The chief difference between them consists in the relative quantity of the yolk element present, this apparently depending on the degree of development which the young attain before leaving the egg. Thus birds, which leave the shell in a highly developed state, have in their eggs a large quantity of yolk, besides the albumen or "white," which is added to the egg before it receives its outer calcaceous covering and which, along with the yolk, serves as a storehouse of food for the young chick during the process of incubation. In insects, on the other hand, which leave the egg in the immature condition of larve, the yolk is comparatively small, as it is also in mammals, whose young are born in a comparatively undeveloped condition. The process of incubation, which is continued only until the egg is hatched outside; a few are ovo-ooviviparous, the eggs being retained in the oviduct until the young are ready to leave; while mammals are viviparous, the young, after leaving the egg, attaining considerable development before birth, in the womb of the female. In oviparous animals, the egg, within certain limits, is proportional in size to the adult form to which it gives origin; the larger the bird, for example, the larger, as a rule, is the egg. This, however, is not without exceptions; thus the eggs of the guillemot is as large as that of the eagle, and ten times larger than that of the raven, although guillemot and raven are of nearly equal size.

Owing to the fluid nature of the contents of eggs, they are generally roundish in form, although in this respect they also offer considerable variety; thus the eggs of owls and of turtles are nearly spherical, those of ducks, crocodiles, and snakes oval, and those of most sea-fowl pear-shaped. The external covering is generally more or less smooth, thin, or thick, in the eggs of birds, but in the case of insects it exhibits the most varied markings, being covered with spinous tubercles, and pits, often symmetrically arranged. Considerable diversity also exists in the composition of the outer covering of the egg in oviparous animals; in snakes and lizards it consists of a parchment-like membrane not unlike the inner coating of a hen's egg; in birds, turtles, and the majority of mammals, it is a semi-transparent, cartilaginous or albuminous covering which is secreted by the viscous glands, and in the higher mammals, such as man, cartilaginous fishes, as sharks and rays, the egg in passing through the oviduct is imbedded in a four-sided horny case, from the corners of which tendrils are given off, by which the egg-capsule is moored to floating sea-weed. These, after the escape of the young fish, are often cast upon the shore, where they are familiarly known as "mermaid's purses." The external covering of the eggs of oseous fishes, as salmon and trout, is exceedingly tough and elastic, "rebonding," says Mr Frank Buckland, "from the floor like an india-rubber ball;" and this no doubt prevents them from being crushed in the gravelly beds of the running streams in which they are deposited, and are separated from fresh water by a tough layer of albuminous substance, which expands in water into a transparent jelly. The eggs of the frog occur in great masses, piled together like miniature cannon balls, while those of the toad are connected together so as to resemble strings of beads. Among many molluscous animals the eggs are provided with an additional covering or nidus, consisting of a leathery pouch or cup, containing a large number of eggs. These capsules are either attached singly, by little stalks, to the rocks as in the common purpura (Purpura lapillus), or are extruded in a compound mass as in the whelk (Buscarius undatum). Those of the latter were named by Ellis "sea wash balls," from being used by the sailors instead of soap to wash their hands, and are common objects on the sea-shore. The greatest variety exists in the number of eggs produced by different animals, and even among forms allied to each other. Thus the common snail produces only from tens of thousands. Among insects, the white ant is pre-eminentin proflicity, the queen being said to lay about sixty eggs in a minute, or upwards of 80,000 in a day, and as this probably continues for two years, it is estimated that the total number of her eggs amounts to fifty millions. Among mollusks the spawn or

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EGG.—EGG.

EGG, AUGUSTUS LEOPOLD (1816–1863), a painter, was born on 24 May 1816, in Piccadilly, London, where his father carried on business as a gun-maker. He had some schooling at Eton, and was not at first intended for the artistic profession; but, developing a faculty in this line, he entered in 1834 the drawing class of Mr. Sass, and in 1835 the school of the Royal Academy. His first exhibited picture appeared in 1837 at the Suffolk Street Gallery. In 1838 he began exhibiting in the Academy, his subject being a Spanish girl; altogether he sent twenty-seven works to this institution. In 1848 he became an associate, and in 1860 a full member, of the Academy. In 1857 he took a leading part in selecting and arranging the modern paintings in the Art-Treasures Exhibition in Manchester. His constitution being naturally frail, he went in 1853, with Dickens and Wilkie Collins, to Italy for a short trip, and in 1863 he visited Algeria. Here he benefited so far as his chronic lung-disease was concerned; but, riding out one day exposed to a cold wind, he caught an attack of asthma, which cut him off on 29th March 1863, at Alger, near which city his remains were buried.

Egg was a gifted and well-trained painter of genre, chiefly in the way of historical anecdote, or of compositions from the poets and novelists. As years progressed, he developed in seriousness of subject matter and of treatment, and at the time of his death he might be ranked among our best painters in his particular class—clever, skilled, and observant—although he had not any marked originality of point of view or of style. Among his principal pictures may be mentioned: 1839, the Introduction of Sir Pierce Shafton and Halbert Glendinning (from Scott's Monastery); 1846, Buckingham Rebuffed; 1848, Queen Elizabeth discovers she is no longer young; 1850, Peter the Great sees Catharine for the first time; 1854, Charles I raising the Standard at Nottingham (a study); 1855, the Life and Death of Buckingham; 1857 and 1858, two subjects from Thackeray's Esmond; 1858, Past and Present, a triple picture of a faithless wife; 1859, the Night before Naseby; 1860, his last exhibited work, the Dinner Scene from The Tempest of the Shrew. The National Gallery contains one of his earliest pictures, Patience entertaining two Ladies, from the Duble Boutez, it was painted in 1844.

Egg was rather below the middle height, with dark hair and a handsome well-formed face; the head of Peter the Great (in the picture the Winter and Catharine, who was regarded as his best work, along with the Life and Death of Buckingham) was studied, but of course considerably modified, from his own countenance. He was manly, kind-hearted, pleasant, and very genial and serviceable among brother-artists; social and companionable, but holding mainly aloof from fashionable circles. As an actor he had uncommon talent. He appeared among Dickens's company of amateurs, in 1852 in Lord Lytton's comedy Not so Bad as we Seem, and afterwards in Wilkie Collins's Frozen Deep, playing the humorous part of Job Want.

EGNIARD is best known as the biographer of Charlemagne. His name is variously spelled in manuscripts. Einhardus, Einhartus, Heinhardus, Heinhardus, are the earliest forms. In the 10th century it was altered into Aguanus, and out of this form arose Eggnardus and Egginhardus. The French and English languages have adopted this latter form; but it is unquestionably wrong, and the weight of authority is for Einhardus or Einhartus. The circumstances of his life are involved in considerable obscurity, owing partly to the want of scrupulosity or indefiniteness of our authorities. According to the statement of Walfridus Strabo, a contemporary, he was born in the district which is watered by the river Maine in the modern duchy of Hesse.
Darmstadt. Teulet has disputed the genuineness of the document in which the statement is contained, because "it exists only in one manuscript of the 15th century, and it contains an evident anachronism." The anachronism, however, is a mistake on the part of Teulet, for he understands by "pedagogium Sancti Bonifacii" a school taught by St Boniface, whereas it plainly means a school in the monastery of St Boniface, as Jaffe takes it. The date of his birth can only be conjectured, but it must be somewhere about the year 770 A.D. His parents were noble, and probably their names were Elnhardt and Engilfrit. He was educated at the monastery of Fulda. There is documentary evidence that he was resident in that place in the years 788 and 791. Owing to his intelligence and ability he was transferred from the monastery by its abbot Baugolus to the palace, where he became intimate with the emperor and his family, and received commissions of great trust and importance. His removal to the palace took place not later than 796.

He was entrusted by the emperor with the charge of public buildings. He thus became one of the imperial ministers, and resided with the emperor at Aix-la-Chapelle. In reference to his artistic skill he received the Scripture name of Beated (Exod. xxxi. 24, and xxxv, 30), according to a fashion then prevalent of giving ancient names to contemporaries. Some suppose that he constructed the basilica at Aix-la-Chapelle and the other buildings mentioned in chapter xviii. of his Life of Charlemagne, but there is no express statement to that effect. The emperor employed him in 806 as legate to Rome to obtain the Pope's signature to a will which he had made in regard to the division of his empire. Hence the inference has been drawn that he was the emperor's secretary; but no contemporary ascribes this office to him.

It was owing to Eginhard's influence that in 813 Charlemagne made his son Louis partner in the empire. Louis, on becoming sole emperor, proved grateful to Eginhard, retained him in the office of head of public works, made him tutor to his son Lothair in 817, and showed him every mark of favor.

Eginhard married Imma, a noble lady, a sister of Bernharus, who was bishop of Worms and abbot of the monastery of Wiesenbug. Later tradition converted Imma into the daughter of Charlemagne, and invented a romantic story in regard to the marriage of Eginhard and Imma. It is doubtful whether he had any offspring. Eginhard addresses a letter to a person called Vusin, whom he styles "filii," "mi nato." These expressions and the tenderness of the language almost compel the belief that Vusin was his son; but as Vusin is never mentioned in several deeds in which his interests would have been concerned, and in which the names of Eginhard and Imma appear, some have supposed that Vusin was merely a spiritual son.

On January 11, 815, Louis bestowed on Eginhard and his wife the domains of Michelstadt and Mulheim in the Odenwald on the Maine. In the document conveying this property to him he is simply called Elnhardt, but in a document of June 2, 815, he is called abbot. In becoming abbot he did not dismiss his wife. After the period we find him at the head of several monasteries — Blanduny of Ghent, Fontenelle in the diocese of Rouen, St Bavon of Ghent, St Servais of Maastricht, and St Cloud (but not the St Cloud near Paris), and he had also charge of the church of St John the Baptist at Tavis.

Eginhard began to grow tired of the intrigues and troubles of court life, and in 830 finally withdrew to Mulheim, which he named Seligenstadt, where he had erected a church to which he had transported the relics of St Marcellinus and St Peter. His wife helped him in all his efforts, and her death in 836 caused him bitter grief. The emperor Louis visited him in his retreat the same year, probably to console him, but Eginhard did not long survive his wife, for he died March 14, 840.

Eginhard was a man of culture. He had reaped the benefits of the revival of education brought about by Charlemagne, and was on intimate terms with Alcuin. He was well versed in Latin literature, and knew Greek. He was very small in body, a feature on which Alcuin wrote an epigram. His most famous work is his Vita Caroli Magni, written in imitation of the Lives of Suetonius, is the most reliable account of Charlemagne that we have, and a work of some artistic merit. It was written soon after the death of the great emperor. It was very popular in the Middle Ages. Pertz collated upwards of sixty MSS. for his edition.

The other works of Eginhard are — (1) Annals Francorum, extending from 741 A.D. to 829 A.D.; some doubt their authenticity, without good reason; (2) Vita Notabilis, handed down only in MSS., not at Laon and of considerable importance for the history of the times; (3) Historia Translationis Beatorum Christi Martyrum Marcellini et Patii, written in 830, and giving a curious narrative of how the bones of the martyrs were stolen and conveyed to Seligenstadt, and what miracles they wrought there; (4) This is added to the same subject. A treatise written by him, De Adoranda Cruce, has not come down to us.

The literature on Eginhard is very extensive, almost all who deal with Charlemagne, early German literature, and early French literature treating of him. The fullest and most accurate accounts are given by Teulet and Jaffe in their editions.

The modern editions of Eginhard's works are by Pertz in vol. i. and of his Monumenta Germaniae Historica, Hanover, 1856; 1859; Teulet, Elnhardt omnia que extant Opera, Paris, 1840; Migne, Patrologia Latina, tom. 104, Paris, 1866 (the Life of Charlemagne is in vol. 97), and Philip Jaffe in vol. iv. of his Bibliotheca Hterarum Germanicarum, Berlin, 1857. Teulet's is the most perfect edition, and he describes special praise in connection with the letters. Pertz and Jaffe published the Life of Charlemagne separately for the use of scholars. Teulet gives a full account of all previous editions, of the MSS., and of translations. Some of the other editions contain bibliographical references. A translation of the Life of Charlemagne has appeared in English by W. Glazier, London, 1877 (J. D.)

EGLANTINE (E. Frisian, epelltore; French, aglantier), a name for the sweet-brier, Rosa rubiginosa, and for R. lutea, another species of Lindley's tribe of Rosa Rubiginosae, and apparently the R. Eglanteria of Linnaeus. The signification of the word seems to be thorn-tree or thornbush, the first two syllables probably representing the Anglo-Saxon egle, egle, a prick or thorn, while the termination is the Dutch tera, (ara, a tree (see Wedgwood, Dict. Eng. Etymology). Eglantine is frequently alluded to in the writings of English poets, from Chaucer downwards. Milton, in L'Allegro, l. 48, is thought by the term "twisted eglantine" to denote the honeysuckle.
EGL—EGR

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as the saviour of Flanders from devastation by the French. He was nominated by Philip stadtholder of the provinces of Flanders and Artois. At the conclusion of the war by the treaty of Cateau Cambresis, Egmont was one of the four hostages selected by the king of France as pledges for its execution. As stadtholder he now showed some sympathy with the popular discontent excited by the Spanish Government, and particularly by Cardinal Granvelle, minister to the regent Margaret. As a member of the council of state he joined the prince of Orange in a vigorous protest addressed to Philip (1561) against the proceedings of the minister; and two years later he again protested in conjunction with the princes of Orange and Count Horn. He was invited by Philip to go to Spain to confer with him on the subject of the remonstrance, but he declined. Egmont, however, who was a strict Catholic, afterwards spoke in less hostile terms of the minister; and, at the same time that he was currying the favour of the middle classes, he was becoming more a favourite at the court of the regent. In January 1563 he accepted a special mission to Spain to make known to Philip some extent the state of affairs in the Netherlands and the demands of the people. At Madrid the king gave him an ostentatious cordial reception, and all thecourtiers vied with each other in lavishing professions of respect upon him. But earnest discussion of the real object of the mission was evaded by the king, and Egmont had to return to the Netherlands loaded only with fine words of flattery and promise. At the very same time instructions were sent to the regent to abate nothing of the severity of persecution and the Inquisition was re-established. Egmont was indignant, and the people were in a state of frenzied excitement. In 1566 a confederation of the nobles (Les Gueux) was formed, the document constituting it being known as the Compromise. Egmont then withdrew to his government of Flanders, and showed himself, after some vacillation, an unscrupulous supporter of the Spaniards and fierce persecutor of heretics. In the summer of 1567 the duke of Alva with an army of veterans arrived in the Netherlands, to supersede the regent Margaret, and to crush with the strong hand the popular opposition. One of his first acts was the arrest of Count Egmont and Horn, who were imprisoned at Ghent. A sham process was begun against them, and after some months they were removed to Brussels, where sentence was pronounced by Alva himself on the 6th June 1568. Egmont was declared guilty of high treason and condemned to death. It was in vain that the most earnest intercessions had been made in his behalf by the emperor Maximilian, the order of the Golden Fleece, the states of Brabant, the electors of the empire, and the regent herself. Van, too, was the pathetic pleading of Egmont's wife, who with her eleven children was reduced to want, and had taken refuge in a convent. Egmont was beheaded at Brussels the day after the sentence was pronounced, June 5. He met his end with calm resignation; and in the storm of terror and exasperation to which this tragedy gave rise Egmont's sufferings were forgotten, and he and his fellow victim to Spanish tyranny were glorified in the popular imagination as martyrs of Flemish freedom. This memorable episode proved to be the prelude to the famous revolt of the Netherlands, the issue of which was independence. Goethe's poem of 1856 was founded on this event. In 1865 a monument to Counts Egmont and Horn, by Friaen, was erected at Brussels.

Full details may be found in Berichts Geschicht des Ortes Egmont (1810); Clonet's Histoire du Comte d'Egmont (1823); Françoix's History of Philip the Second; Jontest's History of the Dutch Republic (1849); and Juste's La Compagnie d'Egmont et de Comte d'Hornes (1862).

EGRET. See Hirond.
EGYPT

Plate VI. Egypt is a country at the northeasterly extremity of Africa, bounded on the N. by the Mediterranean Sea, on the E. by Palestine, Arabia, and the Red Sea, and on the W. by the Great Desert.

The name of Egypt in hieroglyphics is Kem, which becomes Ënëm in Coptic, or Ënëm (Saabic), Kheshekh (Basboun), and Kh Phillips (Memphitic), with unimportant variants. The sense is "the black (land)," Egypt being so called from the blackness of its cultivable soil.

In Hebrew Egypt is called Mizraim, Ënëm, a dual, sometimes used as a singular. It describes the country with reference to its two great natural divisions, Upper Egypt and Lower Egypt, or the Delta. In the prophecies Mazor, "the land of Mazor," occurs as the singular form, and means Lower Egypt, Pathroes being used for Upper Egypt. Thus Mizraim may be compared to the two Sicilies, though sometimes we find Mizraim for the lower country where we should expect Mazor. (Geour, Thes. s. s. Mizraim.) The meaning of Mazor is probably the "fortified," rather than the "border," referring to the natural strength of the country.

The Greek Ägyóptos first occurs in the Homeric writings. In the Odyssey it is the name of the Nile (masculine) as well as of the country (feminine). Afterwards it is not used for the river. No satisfactory Egyptian or Semitic origin has been proposed for it. The probable origin is the Sanskrit root gyp, "to guard," whence may have been formed Äyptos, "guarded about," a similar sense to Mazor. The Hebrew Mazor is preserved in the Arabic Misr, pronounced Misr in the vulgar dialect of Egypt.

1 Cf. Plat. De India et Orient. cap. 33. Dr Brugsch objects to the idea, that Kem may be connected with the biblical patriarchal name Ham, (forming part of poetic names of Egypt in the Psalms — "the land of Ham," cv. 63, 77, cv. 22; "the sons of Ham," Is. viii. 61), on the ground that it is philologically difficult to connect the Egyptian Kem with Ham (Geor. Inscr., i. p. 74, note 8). This objection would be valid were the case one of a Semitic word transcribed in ancient Egyptian; it is not so where we have a root which is common, as this may be, to both (cf. Bunsen's Egypt's Place, t. 751, 758). The meaning of the Hebrew root Kph is "hot, warm." The Arabic root 75 signifies "it became hot," and describes blackness as a result of heat; and the word 75 black mud also occurs.

2 The use of Mizraim as the proper name of an individual appears to be as early as the time of Rameses II. Mizraim occurs as the name of a hill, the brother of the king (Brugsch, Geor. Inscr., ii. 35, pl. xvii. 77). The Hebrew dual form is similarly transcribed in Misktrim, Masaam, Masaam (n. 61, pl. xxiv. 29), a word not actually dual, and the Semitic dual also in Nebamim, the Hebrew Naharim (n. pl. ix. 333).

3 Pathros may take its name from the Pathyros Nome, so called from its metropolis, P-hat-bar (Brugsch, Geor. Inscr., i. 185, 189, pl. xxvi. 839). As this nome contained Thebes, it might have a significance like Thebais. De Rouge prefers p-to-re, "the country of the south," or Upper Egypt. (See Francius Dastastus, Mem. de l'Inst., xxv. 931.)

4 Dr Brugsch has conjecturally identified Äyptos with Hâkephath, the sacred name of Memphis, from which is the westernmost branch of the Nile, the Canopic, with its two mouths, the Canopic and the Red Butane, those best known to the early Greeks, seem to have been called (Geor. Inscr., i. 83)."}

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EGYPT

It occurs in the Koran as the name of Egypt (iii. 50), but has been applied to the country and to its chief capital since the Arab conquest, El-Fustâ, now called Mâr â'Atsah, or Old Misr, and El-Kâhir, the Cairo of the Europeans.

By the Greeks and Roman Egyptians was usually assigned to Asia, though some gave it to Libya, or Africa. This difference was owing to the adoption of the Nile as the division of the two continents, which would naturally have given half of the country to each continent.

In ancient times Egypt was the country watered by the Nile north of the First Cataract, the deserts on either side being assigned to Arabia and Libya. The Egyptian name "the black land," is only applicable to the cultivable lands. The Mur of the Arabs is distinctly restricted to the same territory, the adjoining deserts being called the deserts of Egypt. Physically, ethnographically, and politically, the two tracts are markedly different, but it is now usual to treat them as a single country.

PHYSICAL GEOGRAPHY, PRODUCTIONS, AND INHABITANTS.

The political advantages of Egypt, in situation, natural strength, and resources, can hardly be overrated. It has the very route of the trade between Europe and Asia, and between Africa and the other two continents. It is the gate of Africa, and the fort which commands the way from Europe to the East Indies. The natural ports on the Red Sea and the Mediterranean, selected and improved by the wisdom of Alexander and the Ptolemies, whose enterprises have been eclipsed by those of M. de Lesses in our own days, have always been enough for its commerce, which the great inland water-way of the Nile has greatly aided. The inhabited country, guarded by deserts and intersected in Lower Egypt by branches of the Nile and canals, in Upper Egypt closely hemmed in by the mountains on either side, is difficult to reach and to traverse; at the same time its extreme fertility makes it independent of supplies from other lands, and thus easier to defend. The ancient wealth and power of Egypt should occasion us no wonder, nor even that the country still prospers in spite of centuries of Turkish misrule.

"The extent of the cultivated land in Egypt [Mr. Lane calculates] to be equal to rather more than one square degree and a half; in other words, 5500 square geographical miles. This is less than half the extent of the land which is comprised within the confines of the desert; for many parts within the limits of the cultivable land are too high to be inundated, and consequently are not cultivated, and other parts, particularly in Lower Egypt, are occupied by lakes, or marshes, or drifted sand. Allowance also must be made for the space which is occupied by towns and villages, the river, canals, &c. Lower Egypt comprises about the same extent of cultivated land as the whole of Upper Egypt." Since the date when this was written...
1844, the extent of cultivated land has increased. This has been chiefly due to works of irrigation in Lower Egypt, the increased cultivation of cotton, and the greater facility of transport. The increase cannot, however, be very large.

Diamm --The ancient like the modern Egyptians followed the natural division of the country into two tracts, the valley of Upper Egypt and the plain of Lower Egypt. The names in hieroglyphics are to-re, the "south land" (compared, with the article prefixed, to-re, to Pathros by M. de Rouge), and to-mer, the "north land." The two were divided by the southern boundaries of the highest plains of Lower Egypt, the Memphite and Helopolis, and thus the political boundary was somewhat south of the position where the valley extends into the plain.

The most southern nome of Upper Egypt was called that of Naba, and began at Sais. The Greek and Roman division excludes the Menophite Nome from Lower Egypt.

It is not known at what date Egypt was first divided into the provinces called Names. They are noticed in inscriptions of Dynasty IV. (Brugsch, Geogr. Inschr., i, 93), and from that time onward the name of Hesperia, the "two names," fifth king of Dynasty I, Manetho's Unaphedus. The hieroglyphic name is hpsr. In later inscriptions the term (psr) occurs, which is also the demotic form, and the origin of the Coptic (ID, i, 94, 98).

The number of nomes is somewhat different in the various ancient Egyptian lists, all of which, except fragments, are of the Graeco-Roman age. Probably the number varied at different times. Dr. Brugsch conjectures the true number to be forty-two, considering the forty-two judges of the dead (Rev. xiv, 19) as called from the chief towns of the kingdom to a great tribunal (Geogr. Inschr., i, 99), which he thinks represents the earthly court described by Diodorus Siculus (v, 75) (Geogr. Inschr., i, 124).

There was a double system of names for the nomes, the serial, usual in hieroglyphics, and the vulgar, taken from the capitals, and preserved in Greek in transcription or translation. In consequence of this double system the identification of the hieroglyphic names with those of the Greeks and Romans is not always certain. This is the case in Lower Egypt, where the form of the country makes it difficult for the exact geographical relation intended by any order. On account of this difficulty, and because the hieroglyphic names are of inferior importance in the geography of Egypt, they are not here given. (See Brugsch, Geogr. Inschr., i, 93, seq.)

By the Greeks and Romans Egypt was divided into the Delta or lower country, and the Thebais or upper country. The third division, the so-called Middle Egypt, first occurs in Ptolemy as the Seven Nomes, Ευκίτου, or Ἐρυθροῦ.

There is another name of the same as the foregoing, Ἐρυθροῦ Πολιτικός, the political division of Egypt, as extended by the Greeks and Romans. This is the same as the Menophite Nome from Lower Egypt to the Thebais, and the Thebais, as the divisions to which nomes thus designated are known to belong.

L. Alexandria, Αλεξανδρίαν χώρας οὐδεὶς, Ptol. Nu
H. Ἡρακλείαν, Αλεξανδρίαν, Nu
I. Ἡρακλεόντες (ὑ), ἹσΖάονος, Nu
J. Εὐκίτου, Ἐρυθροῦ, Nu
K. Ἐρυθροῦ Πολιτικός, Ἐπούλων, Ptol. Nu
L. Λάνκας, Ἐρυθροῦ, Her
M. Ἐρινωπός, Ἐρυθροῦ, Strab. Ptol. Nu
N. Αἰγύπτιος Ἐρυθροῦ, Ἐπούλων, Ptol. Nu
O. Αἰγύπτιος Ἐρυθροῦ, Ἐπούλων, Ptol. Nu
P. Ἐρυθροῦ Πολιτικός, Ἐπούλων, Ptol. Nu
Q. Ἐρυθροῦ Πολιτικός, Ἐπούλων, Ptol. Nu
R. Ἐρυθροῦ Πολιτικός, Ἐπούλων, Ptol. Nu
S. Ἐρυθροῦ Πολιτικός, Ἐπούλων, Ptol. Nu
T. Ἐρυθροῦ Πολιτικός, Ἐπούλων, Ptol. Nu
U. Ἐρυθροῦ Πολιτικός, Ἐπούλων, Ptol. Nu
V. Ἐρυθροῦ Πολιτικός, Ἐπούλων, Ptol. Nu
W. Ἐρυθροῦ Πολιτικός, Ἐπούλων, Ptol. Nu
X. Ἐρυθροῦ Πολιτικός, Ἐπούλων, Ptol. Nu
Y. Ἐρυθροῦ Πολιτικός, Ἐπούλων, Ptol. Nu
Z. Ἐρυθροῦ Πολιτικός, Ἐπούλων, Ptol. Nu

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Διασώστικα: Μικρή χάρασσα του ερυθρού πολιτικού, που ακολουθεί την ερυθρή πόλη γύρω από την περιοχή της Καταλύσης, έχει δύο βασικές επιτάξεις: την δυτική και την εαυτική. Η περιοχή της Δυτικής Ελληνικής και της Επούλων είναι γνωστή από την αρχαιότητα, καθώς και η τεχνική της ερυθρής πόλης, που χρησιμοποιείται για την κατασκευή και την διασκεδαστική τεχνοτροπία.
The Syrian 'Ap'asa, 1. PharbllBthitea, Stlbennytal. territory of the Heptanomis does not appear in the hieroglyphic laws, because Sakel, the crocodile-headed divinity there worshipped was, at least in later times, displaced in most parts of Egypt (Brough, Inst. 2 ed., 104, 105).

The Notitia Dignitatum, composed under Theodosius II, A.D. 408-450, gives a new a division of Egypt into four provinces—Egyptus, Augustanum, Arcadia, and Thebaia. Roughly the first comprised all Lower Egypt except the part east of the Delta, which was assigned to the second, and Arcadia appears to have succeeded the Heptanomus (Parthey, Elämendde, 518, taf. vii.).

About the time of Justinian I this division is found to be further developed, according to the statements of Hecataeus. Egypt contained six eparchies:—1. Egypt Proper, Apis-sacred, the west of Lower Egypt to the Sobectytic branch of the Nile; 2. The First Augusta, Apis-sacred a, the north-eastern part of Lower Egypt to the Syrian border; 3. The Second Augusta, Apis-sacred b, the territory southward of the First Augusta; 4. Arcadia, 'Arsach, the earlier Heptanomus; 5. The Nearer Thebaia, Θηβαία η ευχαριστή, extending to Panos, or Panopolis, and including the Great Oasis. 6. The Upper Thebaia, Θηβαία ς ευχαριστή, as far as Philae. The division into nomes had evidently been almost effaced at this time (I. 520, taf. 105).

The Copts preserved the oldest division of the country, and called Lower Egypt, the Northern Region, Α.Β.Σ.Τ. (Mem.), Α.Β.Ρ.Μ. (Sah.), Upper Egypt, the Southern Region, Α.Β.Ν.Θ. (Mem.), Α.Β.Ν.Θ. (Sah.). The names of the nomes were also known to them, and are given by Champollion in L'Egypte sous les Pharaons.

Like the Copts, the Arabs generally know of but two divisions, the names of which are such as the people of the desert would naturally give to the country watered by the Nile. Lower Egypt is called El-Reef, the cultivated, or fertile, and Upper Egypt, Elwaas, the happy, or fortunate.

Under the Memlook sultans of the Bâhârâ dynasty, as we learn from the list appended to De Saify's Abât-Allah, referring to A.D. 715 (A.D. 1315-6), the provinces of Egypt were less numerous than the ancient names. They are for Lower Egypt—the territory of Cairo and the provinces of Kalyoob, the Sharkeyeh, the Dakahlia, the Ed-Dimyât, the scarce, the Kalyoob, and that of Al-Geezeh. The Middle Provinces, E. Akaleel el-Wastaneeyeh, were that of Atfeh, the Feyoom, and those of Bannee-Sweyf or Behnese, and of El-Minya or Ashmooney.2 The Southern Provinces, El Akaleel el-Kileeyeh, were those of Asyoot, Girgh, and Kond.

There is no doubt that these provinces sometimes correspond to the ancient nomes, though generally composed of territories of more than one. (Cf. Jomard in Descr. d'Egypte, 2d ed. ix. 594, 595.) By Mehemet Ali a new division was formed into districts governed by a mukarrir of which Lower Egypt, including a small portion of the Middle Provinces, contained four, and the rest of Egypt three. At the present time Egypt is divided into fifteen provinces, each governed by a mukarrir.

### I. LOWER EGYPT
3. Kalyoobeyeh ... Kalyoob.
4. Sharkeyeh ....... Zagazig.
5. Menoofeyeh ....... Shexben.
7. Dakaleyeh ......... Mansourah.

### II. MIDDLE EGYPT

### III. UPPER EGYPT

—Edmond L'Egypck, 209, 270.

It will be readily understood that much confusion prevails as to the divisions of the country, much especially at times when an arbitrary administrative division has been used side by side with a popular one, depending upon what nature and artificial aids, such as canals and dikes, have been done to map out the country. The general appearance of Egypt is remarkably uniform. The Delta is a level plain richly cultivated, and varied along by the lofty dark-brown mounds of ancient cities, and the villages in groves of palm-trees, standing on mounds often if not always ancient. We sometimes see groves of palm-trees besides those around the villages, but other trees are, except in some parts, rare. In Upper Egypt the valley is in as rich a state of cultivation, but very narrow and bounded by mountains of no great height, which hem it in. They form the edge of the desert on either side of the valley, which has been cut through a rocky table-land by the river. They rarely take the form of peaks. Sometimes they approach the river in bold promontories, and at others are divided by valleys with the beds of rivers which flow only at long intervals. The bright green of the fields, the reddish-brown or dull green of the great river, and the tender tints of the bare yellow rocks, beneath the deep blue sky, always form a beautiful view. In form the landscape varies little and is not remarkable; in colour its qualities are always splendid, and under a general uniformity show continual variety.

**Climate.**—The climate of Egypt, being remarkably equable, is healthy to those who can bear great heat, and who avoid the unwholesome tracts of the country, such as the

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2 M. Jomard states that the older appellations were used for the two provinces of Benee-Sweyf and El-Muneh, though these towns had succeeded the earlier chief places after which the provinces were named. —Descr. de l'Egypte, ix. 594.
n coast, where there are extensive salt-marches.

Egypt is healthier than Lower Egypt. The least
time of the year is the latter part of autumn,
as inundated soil is drying. In the desert, at a very
distance from the cultivable land, the climate is un-
dry and unvariously healthy. Egypt, however, is
able as a permanent residence to Europeans who do
swally modify their mode of life; and it is almost
able to rear European children there; but if they
after the age of ten or a little more they do not
feel its ill effects. As a resort for invalids Egypt
recommends itself without caution. Persons suffering
sore throats and bronchitis are likely to gain benefit from
voyage, unless the season is unusually cold. The
of the desert does not in all cases suit them, the small
of sand which are inhaled increasing the irritation.
E Egypt is undoubtedly good for consumption, and a
in to encamp near Cairo, or still better to find
and of house within the limits of the desert; and
ancient sepulchral grottoes at Thebes and other
I&Ds of having increased once
of the desert does not in all cases suit them, the small
of sand which are inhaled increasing the irritation.
E Egypt is undoubtedly good for consumption, and a
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and of house within the limits of the desert; and
ancient sepulchral grottoes at Thebes and other
I&Ds of having increased once
of the desert does not in all cases suit them, the small
of sand which are inhaled increasing the irritation.
E Egypt is undoubtedly good for consumption, and a
in to encamp near Cairo, or still better to find
and of house within the limits of the desert; and
ancient sepulchral grottoes at Thebes and other
or spring, and if the earliest cases occur towards the close of the year, one may be sure of a plague of great severity and long continuance. At first the cases are generally few, but they gradually increase and, in the hotter weather attain their maximum. The disease is not long in travelling from Alexandria to Cairo, but it rarely ascends much higher up the river, and has seldom been known at Thebes in modern times. Many medical writers have denied the contagious character of the plague, in particular Clot-Bey, a French physician, who was long chief medical officer of the Egyptian Government, and who published a treatise on the subject (Clot-Bey, De la Peste); yet the evidence on the other side is too strong to be rebutted. An epidemic of plague is greatly to be dreaded in the present circumstances of Egypt. Rapid communications would readily bring the disease to Europe, and the interests of commerce would stand in the way of the reasonable precaution of quarantine. It is stated that the plague is endemic in the marshes of Chaldea. Surely it would be well if the European Governments were to appoint a commission for the investigation of the disease and to ascertain what, if any, is the value of the sanitary measures of the Turkish Government.

Dysentery is an extremely common malady, and causes very large mortality. It may usually be traced to a careless course of diet, and especially to eating uncooked vegetables, unripe fruit, or other unwholesome food, and to drinking brackish water. Mr. Lane has published a mode of treatment which has been attended with extraordinary success (Modern Egyptians, App. E. of all later editions). Asiatic cholera visited Egypt in its westward course on the first two occasions of its appearance in Europe. According to the Government returns, which were probably below the truth, nearly 200,000 persons perished from the disease in all Egypt during the great cholera of 1848. It is remarkable that after each of these great epidemics the disease appeared a second time, but with far less destructive results. Among the diseases most dreaded by the European residents is liver-complaint. Those who abstain from alcoholic drinks, or use them with extreme moderation, escape the complaint altogether, or suffer from it in a comparatively mild form. Hemorrhoids and hernia are among the commonest maladies. Skin diseases have been at all times very prevalent in Egypt. Lepracy is now well known, but not common, unlike elephantiasis, which in more than one form has numerous victims. Small-pox was formerly very severe, but it has been checked in its virulence by vaccination. The so-called guinea-worm occurs, but is perhaps not indigenous.

Of the diseases of the eye, ophthalmia is the most formidable, from its prevalence and malignant character; yet perhaps no malady more readily yields to treatment if promptly used. Where the predisposition exists, a slight cause, such as the irritation occasioned by a grain of dust or sand, is enough to produce an inflammation, which, if not checked, inflicts a lasting injury if it does not produce blindness. For this disease Mr. Lane has published a very efficacious mode of treatment (Mod. Ey., App. E.).

Clot-Bey affirms that pulmonary consumption is extremely rare among the native inhabitants (Apercy, ii. 377), yet another physician asserted (but not in print) that he had met with not a few cases in a short practice. Asthma and bronchitis are among the common disorders. The occurrence of coup-de-soleil is not unusual, but it is rarely attended with fatal results, probably on account of the sobriety of the people. Madness is common, generally in the form of idiocy. Maniacs, alone are confined; idiots are regarded with much respect as saints, and it is probable that some persons feign idiocy to become objects of popular veneration, supported by alms. One of the Memlook

...
the constant deposit of the Nile, and the corresponding elevation of the southern part of the isthmus of Suez. The consequence of this change of level has been the ruin of places on the shore of the Mediterranean, the extension of the salt-marshes, and the drying up of a considerable part of the northernmost portion of the Gulf of Suez. The bed of the Red Sea may be traced for several miles north of Suez, which now stands at the head of the western gulf, and places far north of that town were on the coast in ancient times.

The form of the plain and valley inclosed by the deserts is remarkably regular. In Lower Egypt the cultivable land little exceeds the limits of the ancient Delta, but greatly exceeds those of the space between the two remaining branches of the Nile. The northern coast is protected by shoals and a low range of sand-hills. To the south of these are extensive salt-marshes and lakes, or waste tracts, and beyond, the cultivated land. The deserts on either side are of low elevation. To the east of the ancient Delta, a valley, the Wadis-es-Tunaylit, is in course of being reclaimed by the Sweet-Water Canal.

The form of the valley, or Upper Egypt, may be best seen on the map; its leading peculiarities may be noted. Its course is nearly north and south until just within the border of the Thebans, when it takes a north-east direction as far as the town of Girgh, and then turns due east as far as Kue, from which town it resumes its former direction. The mountains and desert on the western side throughout Upper Egypt, that is, above Cairo, are generally further from the river than those on the eastern side, which frequently reach to the water's edge. The difference is most remarkable as far as the town of Farnoosh, by the course of the river about 350 miles above Cairo, and about 70 miles below Thebes. Near Farnoosh begins a continuous series of canals, which flow parallel to the Nile, and near the Libyan chain, until they terminate in Lower Egypt, not far north of Cairo. Above Farnoosh, the eastern mountains recede as far as little above Thebes, and the western mountains gradually approach the Nile. Halfway between Thebes and the First Cataract, the cultivable soil is equally narrow on each bank. The greatest breadth of the cultivable land, all of which is not cultivated, on the western bank seldom exceeds about 8 or 10 miles, and on the eastern bank, about 5 miles, but it is usually much narrower.

There is in the modern Nile valley a striking deviation from the uniform character of the country. About 70 miles above Cairo, by the course of the Nile, an opening in the Libyan range leads to a kind of oasis, the Fayoum, a fertile tract, lying in a hollow of the desert, and having at its further extremity a great lake of brackish water.

The Nile—The chief natural feature of Egypt is the Nile, and the great phenomenon of the country the yearly inundation. With the ancient inhabitants the river had, according to their usage with such names, two appellations, sacred and common. The sacred name was Hapi, the same as that of one of the four genii of Ament (Hier. i., 12, 13, 18, 24); the probable meaning is "the concealed" (Brugsch, Geogr. Inschr., l. 77). The profane name was Atur, or Aur, usually with the epithet, as the great. The two forms, of which the first appears to be the older, the second the younger, mean "river," and are equally the case with the demotic and Coptic forms of Aur (Ed. p 78). There are at least three names of the Nile in the Bible,—Yob, (797, 798), the same as the Egyptian name last mentioned, and probably of Egyptian derivation; Sheshen (876, 877, 875), the black; and "the river of Egypt," Shione, or "the Euphrates" (791, 792), spoken of as the western limit of Palestine, and so the eastern limit of Egypt, as either a desert stream at Rhinocorus, now El-Areesh, or the Pelusiac or easternmost branch of the Nile.

The Greek and Roman name Nilos, Nileus, is certainly not traceable to either of the Egyptian names of the river, nor does it seem to be philosophically connected with the Hebrew ones. It may be, like Shishor, indicative of the colour of the river, for we find in Sanskrit, Nilus, "blue," probably especially "dark blue," also even black, as Nilava, "black mud." The two great confluents of the Nile are now called the Bahr-el-Abyad, or "White River," and the Bahr-el-Azrak, or "Blue River," and the latter most nearly resembles the Nile in Egypt. As already noticed, Afeneos, in the Odyssey, is the name of the Nile (mas.) as well as of the country (fem.).

The Arabs preserved the classical name of the Nile in the proper name En-Neel, or Neel-Misr, the Nile of Misr (Egypt). The same word signifies "narrow." The modern Egyptians commonly call the river El-Bahr, "the sea," a term also applied to the largest rivers, and the inundation "the Nile," En-Neel; and the modern Arabs call the river Bahr-en-Neel, "the river Nile." The course of the Nile has already been noticed in speaking of the form of the Nile valley. In ancient times the Delta was watered by seven branches; now there are but two, the other ancient branches being canals not always navigable. The ancient branches were, beginning at the west, the Canobos, Bolbute, Sobennute, Pathymeian, Mendesian, Tantian, and Pelusiac, of which the modern Rosetta and Damatta branches represent the Bolbute and Pathymeian.

The mean breadth of the river in Upper Egypt may be put at half a mile to three-quarters, except where large islands increase the distance. In the Delta the branches are generally narrower.

A remarkable change has been ascertained to have occurred in the level of the Nile above Gebel-es-Sibalsh (near the ancient Sibias, more than 80 miles south of Thebes), and throughout part of Nubia. Indications of this change were first observed by Professor Leguan, who discovered hieroglyphic inscriptions on rocks at the Cataract of Semna, not far above the Second Cataract, showing that the river attained a much higher level in the time of Dynasties XII and XIII, before B.C. 2000. He gives the difference of the mean water-level at Semna as 7 to 20 metres, or 23 to 65 feet English. He observes that the whole level of Upper Nubia was anciently greater, and similarly that of Lower Nubia between the First and Second Cataracts, but that in this second tract the present level was attained since the time of Thothmes III, of Dynasty XVIII (A Camb. Journ. i., 81, 1843). Sir Gardner Wilkinson pursued the inquiry in a paper in which he argued that the cause of the change of level which he traced in the Upper Thebans was the breaking of a rocky barrier at Gebel-es-Sibalsh, where the low mountains on either side confine the river to a narrow channel (Trans R Soc. Edinb., 110th Sept. 1844.). Sir Gardner Wilkinson took the inquiry a step further in a paper in which he argued that the cause of the change of level which he traced in the Upper Thebans was the breaking of a rocky barrier at Gebel-es-Sibalsh, where the low mountains on either side confine the river to a narrow channel (Trans R Soc. Edinb., 110th Sept. 1844.).

The water of the Nile differs considerably in appearance and purity at various seasons of the year. A little after midsummer it becomes very turbid, and not long afterwards...
it assumes a green colour for more than a fortnight, owing to the quantity of vegetable matter which it brings down from its upper course. It then resumes its turbid character for the period of the race, and retains it, though in a less degree, for the remaining portion of the year, until the following midsummer. The water is extremely sweet, particularly in its turbid state. A careful filtration destroys its peculiar flavour, and the best method is to allow it to settle in the porous jars manufactured in the Island of Er-Rôdah, near the mouth of the river, which attains to a certain height in feet or metres, at certain dates. The river attains its greatest height in July, 2, 1799, to April 6, 1800, during a good inundation. The water presents much argillaceous matter, taken from the banks of the Nile, and carried by the waters of the inundation to distant tracts it loses a quantity of sand in proportion to the distance, so that, when the distance is very considerable, the argillaceous matter is nearly pure; and thus the soil presents this matter in the different degrees of purity which the arts of potting and brick-making require (Deser. de l'Egypte, xx. 162-164).

The Nile shows the first signs of rising in Egypt about the time of the summer solstice. At Khartoom, where the White and Blue Nile join, the beginning of the increase is observed early in April (Clot-Bey, p. 36, 37). The slowness of the rise in the earlier stage causes this difference. Usually the regular increase does not begin in Egypt until some days after the summer solstice, and the inundation begins about two months after that solstice. The river attains its greatest height at, or not long after, the autumnal equinox, and then, falling more slowly than it had risen, sinks to its lowest point at the end of nine months, when it remains stationary for a few days, until it begins again to increase. The inundation continues rather longer than it naturally would do, because the waters are retained for some time upon the land by closing the mouths of the canals (see the table, Deser. de l'Egypte, xvii. i. 630, seqq., for the details of the state of the Nile, from July 3, 1799, to April 10, 1800). The river's banks being a little higher than the rest of the cultivated soil, the water is conveyed by canals or cuttings, and does not pour over the banks.

The inundations vary considerably, and, by either falling or rising too great a height, cause much damage and distress. In the Description de l'Egypte (xvii. i. 628-629) there is a table of 60 inundations, of which 11 were very high, 30 good, 16 feeble, and 9 insufficient. This table was taken from the official records of the Nilometer on the island of Er-Rôdah, near Cairo, and comprehends the inundations of A.H. 1150-1215 (A.D. 1737-1800).

The Nile rises about 40 feet at the First Cataract, about 56 at Thebes, about 25 at Cairo, and about 4 at the Rosetta and Damietta mouths during a good inundation (Encyclopaedia of Egypt, i. 89; Deser. de l'Egypte, xvii. i. 576, 577). When it is said, however, that the river has attained to a certain height in feet or cubits, the height at the Nilometer of Er-Rôdah above-mentioned is meant; and by ancient writers, that of the river at Memphis, which was situated on the western bank, a little higher than Er-Rôdah. If the river do not attain a greater height than 16 or 20 feet, the inundation is scanty; if only 2 or 4 feet more, insufficient; if it attain to 24 feet, or a greater height, not exceeding 27 feet, the inundation is good; but a greater rise must be characterized as a destructive flood (Deser. de l'Egypte, xvii. i. 616). Sometimes the inundation has failed altogether; as for seven years (A.H. 1457-1464) in the reign of the Fatimiee caliph El-Mansour bi-l-lâh, when there was a seven-years' famine (see below, page 752) and low inundations always cause dearth. Excessive inundations, on the other hand, produce, or at least foster, the plague and murrain; so that a variation of a few feet is productive of the most serious consequences.

The current, when the Nile is low, has been estimated at about 2 miles in the hour, and at about 8 miles an hour when it is high. The volume of water which the Nile pours into the Mediterranean in 24 hours is as follows, according to Mr. Linnard:—

<table>
<thead>
<tr>
<th>Time of Year</th>
<th>Low Nile</th>
<th>High Nile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cubic Metres</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Nile</td>
<td>79,632,551,728</td>
<td>478,317,833,980</td>
</tr>
<tr>
<td>High Nile</td>
<td>71,053,800,040</td>
<td>237,186,928,430</td>
</tr>
</tbody>
</table>

Although the water is abundantly charged with alluvium throughout the year, and especially during the inundation, the annual deposit by the river, except under extraordinary circumstances, is very much smaller than might be supposed. Various computations have been made as to the exact deposit left in a century on the land, but they have not usually differed above an inch. If, however, we compare the quantity of deposit on certain very ancient structures, of which we know the date, we shall find that the amount has materially differed in various places. Such differences are the natural results of irregularities in the river's course, of the strength or weakness of the current at particular places, of the nature of the country, and many other disturbing causes. The mean ordinary rate of the increase of the soil of Egypt has been calculated by Mr. Lane as about 44 inches in a century. M. Girard, in the Deser. de l'Egypte, makes it "very nearly" 126 millimètres, or 4'960 English inches. (For a remarkable instance of rapid deposit, see the Englishwoman in Egypt, i. 152-154, and plan, p. 125.)

The cultivable land of Egypt must be regarded as wholly the deposit of the Nile, but it is vain to attempt a calculation of the period at which this process began, since we cannot conclude that the same rate has always obtained, and we must suppose that the causes at first in operation were very different from those which now regulate the phenomenon.

At the time of the French occupation of Egypt it was found that the cultivable soil occupied only 6921 square miles, or somewhat more than two-thirds of the whole space included between the deserts, but the quantity actually under cultivation did not exceed 5500 square miles, or six-elevens of the entire surface. This proportion has since not materially changed. It was not always so, and the deficiency of the population is the principal cause that so large a proportion of the soil which might possibly be brought into a state of culture is left uncultivated.

Throughout Egypt the cultivable soil does not present any very great difference, being along the line of the river; it contains, however, more sand near the river than at a distance from it. Towards the Mediterranean, its...
quality is injured by the salt with which the air is impregnated, and therefore it is not so favourable to vegetation. Thus condition, however, is not usually found far south of the sea, or the salt-marshes and lakes, which intervene for the most part between it and the land. In Lower Egypt we find the greater portion of the neglected tracts principally to the east and west of the modern Delta, and in its northern portion. In Upper Egypt the narrowness of the valley, and the more numerous population, preserve the country in a better state of cultivation, and the soil is somewhat richer. The largest uncultivated tracts lie on the western bank, where the valley is broadest, and in places where the great canal running parallel to the Nile has fallen into a state of neglect.

Common of the Country.—Although some of the accounts of the classics may be deemed exaggerated when they speak of the population and prosperity of Egypt, we cannot accuse them of errors, except in the number of towns and of the inhabitants of the country, for the monuments show us how rich was Egypt under native rulers, and indicate to what causes this condition may reasonably be assigned. From the time at which the Great Pyramid was built to the Persian invasion, a period of between 2000 and 3000 years, the population of Egypt and its extent of cultivated land far exceeded what they are in the present day. The country does not seem to have been over-peopled; and many causes conduced to prevent this, particularly the serious wars in which the Pharaohs engaged. The long and desolating struggles with the Assyrians and Persians inflicted a severe blow on the interests of the country. Under the Macedonians it recovered much of its former prosperity; and when the Romans held Egypt, it was one of their most productive provinces, and a granary of the empire. During the Roman rule various political causes contributed to the decline of the population. After the Muslim conquest this decay continued almost uninterruptedly until the time of the Fatimides; but from that time until the Turkish conquest the rulers of the successive independent dynasties generally governed the country with a regard for its interests, and cannot be accused of the systematic tyranny and misrule of the Turkish pashas. There was a temporary recovery under the independent or semi-independent Memluk rulers before the French invasion, and in spite of much of the Turkish system the country has again made good progress during the government of the family of Mehemet Ali. To over-taxation, forced labour, and needless wars,—in other words, government in a Turkish sense,—must be attributed the present misery of the peasant population, and the want of lands enough to cultivate the soil.

Physical causes have had far less to do with the impoverishment of Egypt than political ones. The elevation of the tract north of the Gulf of Suez, with the depression of the north coast of Egypt, has much diminished the cultivable soil in the Delta, by increasing the salt lakes and marshes which occupy its northern portion. There is, however, no greater fallacy than to suppose that the sands of the deserts have done injury by encroaching upon the alluvial tracts, and that once fertile regions are buried beneath them. In some places undeniably they have encroached upon the cultivable land, particularly where, as in the case of the canal of the Red Sea, the neglect of the Government had withdrawn the inundation, but no sooner was the Sweet Water Canal opened than fertility returned. On the other hand the deposit of the Nile has been constantly, in almost every part of the country, encroaching upon the deserts and diminishing their extent. It is neglect that has permitted the sand to drift over the soil where there have been no labourers to cultivate it. Above Gebel-es-Silasieh, in Upper Egypt, the change in the level of the river has placed cul-
tivable soil almost wholly beyond the reach of the inundation, and thus made agriculture very laborious, but this is only for the space of about 40 miles in Egypt, where the extent of the cultivable soil must always have been small on account of the narrowness of the valley. The failure of five of the seven branches of the Nile is partly due to the neglect of the Government, as they might all have been re-tained as constantly running canals. And the decay of the great canal which runs parallel to the Nile throughout the chief part of Upper Egypt is traceable to the same cause.

Under the government of Mehemet Ali a great engineering work was begun with the view of bettering the condition of Egypt. This was the construction of a barrage across both branches of the Nile at the point of the Delta, in order to regulate the inundation, and thus render the country more fertile and easy of cultivation. After being abandoned this work is now to be completed. Its operation will on the whole be beneficial, although undoubtedly the power to be thus acquired by the khedive, of regulating the inundation for the benefit of his lands without reference to small proprietors, will be productive of much injustice. Egypt can never regain her ancient prosperity without a radical reform. The country has been governed under the Turks upon the system of getting the maximum of revenue from a peasantry allowed the minimum of sustenance. This is what is meant by the high-flown phrases one hears about the welfare of Egypt. The welfare of the population has never been contemplated. The feudal peasantry are kept at starvation-point, and no one propers but the tax-gatherers of all grades, who constitute the richer class. Yet Egypt is better governed than the other provinces of the Turkish empire which enjoy a purely Turkish administration, for it is held not on the uncertain tenure of an ordinary pashalik, but as a copyhold which it is the interest of the tenant to keep in decent repair.

Agriculture.—Under the Pharaohs Egypt was an agricultural country, and both commerce and manufactures were comparatively unimportant. The main energies of the people were expended in turning to the best account a soil of unrivalled richness, annually watered and renewed by the river. This natural policy was the true one for the prosperity of the country. From the sculptures and paintings of the tombs, we form a clear idea of the agriculture of the ancient Egyptians, while the classical writers give us information respecting the tenure of land, and the laws affecting the cultivators. In the representations of the tombs which picture the daily life of the great proprietors of land, we see what especial attention they paid to the processes of agriculture. We see them constantly overseeing the labourers, and thus watching the interests of their lands. They were especially anxious to conduct the water of the Nile over those tracts which were not above its level at different periods of the year, and to raise it by manual labour to the higher portions of the land. In their canal-system they displayed mechanical skill, as well as in the construction of dams and dikes to retain the water upon the lands; but for raising water they seem to have been contented with the rudest contrivances. Indeed we know of but two methods that were employed in raising water,—the use of the simple machine called in the present day the abdshof, and buckets carried by men. The ordinary abdshof still employed is of the same form as that used by the ancient Egyptians. It consists of a pole resting upon two columns of brick or mud, and having at one extremity a weight, and at the other a rude bowl-shaped bucket suspended by a stick. A man stands beneath it, and pulling down the bucket to the water raises it again, assisted by the weight. (For the ancient form of the abdshof, see ANC. EY, li. 4; for the modern, Mot. Eq., chap. xiv.)
Immediately after the water of the inundation had subsided, the land was ploughed or broken up by the loo, and sowed the seed being sometimes trodden in by goats driven over the field for the purpose. Wheat being the most important field-produce, we find the various agricultural processes connected with it frequently represented. Besides the ploughing and sowing, the harvest is depicted, the reapers cutting the wheat, just below the ear, the ears left in nets or baskets by men or on asses to the threshing-floor, where they were threshed by kine. Sometimes the wheat was bound in sheaves. The same or similar processes with reference to other kinds of grain are portrayed in the tombs, in which we also find curious representations of the vineyards and gardens. The vineyard was not the least valuable part of an estate. Egypt was famous for its wines in the days of the Greeks and Romans, and it is evident that wine must have been prized in earlier times from several kinds being enumerated in the inscriptions, and from its always being seen at the feasts. Besides the vine, other fruit-trees were cultivated, and especially the date-palm. The gardens were often extensive, and were laid out with great formality, partly in consequence of their being watered in the same manner as the fields generally, and contained tanks for fish as well as for purposes of inundation. The Egyptians paid great attention to preserving fish, and the produce of the fisheries of one great artificial lake, that of Moeris, formed an important branch of the revenue. There were also tracts left to reeds, which, if not planted, were at least carefully maintained, on account of their value for manufactures, and as covers for wild-fowl.

Diodorus Siculus states that anciently the land was the property of the priests, of the king, and of the military class (i. 73), and the monuments leave little room to doubt that such was generally the case; for though there were no castes, the upper classes consisted of priests and military officers, and the son usually followed his father's profession. It is stated in the Bible that Joseph purchased the whole of the land of the Egyptians for food during the famine, and gave them seed to sow it, claiming a fifth of the produce as the king's right. The land of the priests alone was not purchased.

The agriculture of the modern Egyptians differs little from that of the old inhabitants. In one respect it is the converse: the ancients excelled in the management of dikes and dams, and raised water only by the converse: the ancients excelled in the management of dikes of course makes the water chiefly and partly in having a hollow wheel instead of the wheel act of tyranny to which even the history of Egypt scarcely ascribed.

The ancients excelled in the management of dikes of course makes the water chiefly and partly in having a hollow wheel instead of the wheel used by the present ruler. (Mod. Eg., xiv.) Steam-pumps are now largely used.

The culture of cotton was introduced by Mehemet Ali with a view to promote his manufacturing schemes, and the Turkish grandees have found it a source of temporary profit. During the American War the profit was at its height, but subsequently it declined. The necessity of constructing dams to exclude the Nile water from the cotton-growing fields has rendered the inundations destructive, and the speculation seems on the whole to have injured the welfare of Egypt.

The agricultural implements of the modern Egyptians are rude in construction, and similar to those anciently employed in the country. One of these, however, was not known to the earlier inhabitants. This is the n'org, a machine "in the form of a chair, which moves upon small iron wheels or thin circular plates, generally eleven, fixed in a similar machine, which is composed of a horizontal wheel turned by a pair of cows or bulls, or by one, and connected with a vertical wheel which is on the same axis as another around which are earthen pots in which the water is raised and poured into a trough. The tiboot is a similar machine, which differs from the sikkiah principally in having a hollow wheel instead of the wheel with pots, in the jaunts or felhes of which the water is conveyed. Sometimes a kawch is employed, which is a bucket like that of the sikkiah, having four cords by which two men dip it into the river or canal and raise the water. (Mod. Eg., xiv.) Steam-pumps are now largely used.

The "re" lands (or those which are naturally inundated) are, with some exceptions, cultivated but once during the year. After the waters have retired, about the end of October or beginning of November, they are sown with wheat, barley, lentils, beans, lupine, chick-peas, &c. This is called the "shatree" (or winter) season. But the "shatree" lands (or those which are too high to be subject to the natural inundation), and some parts of the irrigated, are sown at the same period as the rei lands, generally with wheat or barley. Secondly, in what is called the "safieen," or in the southern part of Egypt the "keydee," or in the "safieen" season, or period of the rise of the Nile, commencing about or soon after the summer solstice, they are sown with mullet ("dural safieen"), or with indigo or cotton, &c. Finally, in the "demerech" season, or period of the rise of the Nile, commencing about or soon after the summer solstice, they are sown with mullet again, or with maize ("dural shammee"), &c., and thus passed with a third harvest. (Mod. Eg., Syst.) The ancient Egyptians made the same, or a similar preparation of the date-palm. The gardens were often extensive, and were surrounded, and from its always being seen at the feasts. Besides the vine, other fruit-trees were cultivated, and especially the date-palm. The gardens were often extensive, and were laid out with great formality, partly in consequence of their being watered in the same manner as the fields generally, and contained tanks for fish as well as for purposes of inundation. The Egyptians paid great attention to preserving fish, and the produce of the fisheries of one great artificial lake, that of Moeris, formed an important branch of the revenue. There were also tracts left to reeds, which, if not planted, were at least carefully maintained, on account of their value for manufactures, and as covers for wild-fowl.

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The agriculture of the modern Egyptians is in a miniature Egypt. It is intersected by numerous small channels which are filled by one or more water-wheels. By these channels the water is spread over the garden, divided by them into many small compartments, edged with ridges of earth. This system of course makes it very difficult to keep a garden in good order, and no great variety of flowers is cultivated.

Though Mehemet Ali was very desirous to encourage manufactures, he did not endeavour enough to apply modern science to the improvement of agriculture, and he did not succeed in getting the promise of Pasha, who succeeded him, always maintained that the country should be agricultural rather than manufacturing, and introduced important improvements during his father's government. This system has been steadily pursued by the present ruler.

Before the time of Mehemet Ali a kind of feudal system prevailed, and much of the land was held by small proprietors under the protection of the great emeere. By the massacre of the Memlooks, the pasha destroyed feudalism, and arbitrarily seized almost all the landed property, rendered private tenure of land a most rare condition. He allotted to those whom he thus unjustly dispossessed annual pensions for life, as the only compensation for an act of tyranny to which even the history of Egypt scarcely affords a parallel (Mod. Eg., ch. iv.). Those whose lands were not confiscated yielded them up through fear, and buried their title-deeds, which are yet so concealed. A system of government in which the supreme overthrows such acts, and subordinate governors perpetrate them, in defiance of the Muslim code and Arab jurisprudence, demands the most thorough and searching reform.

Lakes.—Egypt has always been famous for its lakes,
which have either aided commerce, or supplied the inhabitants of the country with fish and wild fowl, or with valuable vegetable productions, or assisted in regulating the effects of the inundation. All have enriched the land in some one of these ways, and thus they have been important sources of its natural wealth.

Beginning our examination at the north-western extremity of Egypt, we first observe the lake now called Boheyeret-Maryoy, and anciently Lake Mareote. This is an extensive salt marsh rather than a lake, except during the inundation, when its contents are augmented by filtration. Anciently this lake was navigable, and thus contributed to the commercial importance of Alexandria. The country around was cultivated, and produced the famous Mareotic wine. The relations of various travellers show that it was still a lake during the 15th and 16th, and even towards the close of the 17th century; and Villamont in 1590 mentions that in his time the fishermen produced a considerable sum (Deer. de l'Egypte, xvi. 201). When, however, the French army conquered and occupied Egypt (1798-1801) they found its basin to be "a sandy plain, of which the lower portion retained the rain-water, which remained there for a great part of winter" (Id. 200, 201).

On the 4th of April 1801 the English army, which was co-operating with that of the Grand Vizir against the French garrison of Alexandria, cut the dikes of the canal of that city, and admitted the waters of the Lake of Abou-Kee into the ancient bed of Lake Mareote, in order to cut off the water supply of the besieged (Id. 201, 202). The basin of the lake being partially inhabited, some loss of life and property was the result of this act, which has reasonably been much called in question. The unhealthiness of Alexandria is also traceable to the formation of this marsh.

The precedent thus set has been twice imitated, first by the Turks in 1803, and a second time by the English army under General Fraser in 1807. At the present day the lake or marsh is unprofitable, and its shores are uncultivated and uninhabited, the whole wearing the most dreary aspect.

To the north of Lake Mareote is situated that of Abou-Kee, Boheyeret-Abou-Kee. It is the northern most portion of the other lake, from which it is separated by the Mahmoodeyeh Canal (which here occupies the line of the older Canal of Alexandria), and the embankments or dikes which form its banks. It is very small, nowhere measuring 10 miles across, and extremely shallow, usually not exceeding 3 feet in depth. The water is salt, being chiefly derived from the sea, from which the lake is separated by a narrow strip of oolite, though at times the two are confluent, and on the eastern by a similar strip of far less breadth, the shore of the memorable Bay of Abou-Kee.

To the east of the Lake of Abou-Kee is that of Atkoo, Boheyeret-Atkoo. It spreads when full nearly to the town of Rosetta, and is separated from the sea by a narrow neck of land on which stands the large village of Atkoo.

The easternmost of the lakes of Egypt is Boheyeret-el-Menzeleh, which greatly exceeds the others in size. It extends from near the Demiutta Branch of the Nile to the mouth of the old Tanitic Branch, now called the canal of El-Moizz, which passes through the lake to the sea. It also receives the waters of the canals which were once the Mendesian and Pelusian Branches. The northern shore is separated from the sea by an extremely narrow strip of land. At its south-eastern extremity is a long marshy creek extending into the desert. Its average length is about 40 miles, and its average breadth about 15.

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The depth is greater than that of the other lakes, and the water is salt, though mixed with fresh. Upon the surface are numerous islands, and the whole lake abounds in reeds of various kinds. It supports a considerable population of rude fishermen, who dwell in villages on the shore and islands, and live upon the fish of the lake. The reeds are cover for water-fowl of various kinds, which travel in great numbers, and wild boars are found in the marshes to the south. (Mod. Eg. and Thes., p. 446.)

The Lake Serbonas, well known in former times as having swallowed up those passing over its marshes concealed by shifting sands, is now dry, and cannot be any longer included in the list of the lakes of Egypt.

Besides the lakes above mentioned are those called the Bitter Lakes, which should rather be termed marshes, occupying part of the ancient bed of the Red Sea between Suez and Lake Menzeleh, and also the Natron Lakes. The latter, which are very small, are situate in a valley of the western desert, not very far from the river, they will be noticed below.

In Upper Egypt there is but one lake of importance. It is the Birket-el-Karn, or Lake of El-Karn, at the extremity of the Fayiyoum, which is, as already mentioned, an arm on the western side of the river, to which an opening in the mountains leads. The lake is about 35 miles long, and its widest part a little exceeds 7 miles, according to Sir Gardner Wilkinson, while in several places it is considerably narrower. About the middle is a single island. The depth is not great, for the same author, who "sounded in several places," "found that is considered the deepest part to be only 20 feet" (Mod. Egypt and Thes., p. 341-5). Its level is far below that of the Nile, as the bank of the river at Benc-Sewef, at the entrance of the valley leading to the Fayiyoum, is upwards of a hundred feet higher than the water of the lake (Idem. 346). The shores are barren or uncultivated, the northern is desert and bounded by sandy mountains, the southern was in ancient times partly cultivated. The water is brackish and unhonorable, though the fishermen, of whom there are a few, drink it.

The famous Lake Mauro lay between the Feiyoom and the Nile, not far from the river. It was an artificial work executed by Amenemhat III., of Dynasty XII. The irrigation of neighbouring tracts was regulated by it, and its fisheries formed an important part of the revenue. After the subjugation of Egypt by the Romans its dikes were neglected, and by degrees it became ruined. Its position and extent were considered doubtful, until M. Lantin's excellent memoir, published by the Egyptian Society of Cairo, established these points most satisfactorily from the remains of its basin, which are yet traceable (Memoire sur le Lac Mauro, Soc. Eg., 1843). 

Canals.—The canals of Egypt deserve especial attention from their great importance in extending the beneficial influence of the inundation. In Lower Egypt we find, beginning from the west, first the Mahmoodeyeh Canal, which connects Alexandria with the Rosetta Branch, taking yellow within instead of being red or pink, and come into season after those grown on the banks of the Nile.
a similar direction to that of the ancient canal which it has succeeded. It was dug under Mahomet Ali; and although not quite 1000 feet broad, about 12,000 labourers are said to have died in ten months while the work was in progress (Englishwoman in Egypt, i. 47, 48). This is well known to be a tolerably accurate statement of the losses experienced by the unfortunate workmen, and is only one of the many incidents of our own times affords of that reckless disregard of human life, which is one of the worst traits of Turkish character.

Between the Rosetta and Damietta Branches are several canals, some of which are of importance, particularly the short canal of Maucof connecting the two branches, not far from the point of the Delta. To the east of the Damietta Branch are others, of which the most remarkable occupy the beds of the Tanitie and Pelusiac Branches, which have been cleared to a sufficient extent to form canals. The former of these, which lies to the westward of the latter, is called the Canal of EL-Mousa, the first Fatimieh caliph who ruled in Egypt, having been dug by his orders, and the latter bears the name of the Canal of Abu-Munegga, a Jew who executed this work, under the caliph El-Amir, in order to water the province called the Hilah. The last-named canal is connected with the remnants of that which formerly joined the Nile and the Red Sea. Of this important work the greater part was destroyed through neglect, but it has been restored, as the Sweet Water Canal, in order to supply the establishments on the Suez Canal with fresh water. It was of the Pharaonic times, having been begun by Pharaohs, or Sesostris, continued by Neku, and by Darius Hystaspis, and at length finished by Potemly Philadelpbus.

The extent and character of the great canal called the Bulir-Yosof, or Hier of Joseph, which runs parallel with the Nile on its western side, from a little below Cairo to near Alexandria, by the river of a little more than 50 miles, render it the most important work of the kind in Egypt. It is a continuous series of canals rather than one canal. Although the Joseph whence it takes its name is the celebrated Saladin, or Salib-ed-deen, yet it is related that he merely repaired it, and it is not doubted to have been of a much earlier period. Most probably it was executed under the Pharaohs. In the present day it is not navigable except during the season of the inundation, and at other times is dry in various places. Its restoration would not be a work of extreme difficulty, and would greatly benefit the commerce and agriculture of the country, perhaps more than any other undertaking of the kind.

1 A note from the eighth edition of this work is here reprinted in substance. — Writers on the East have not generally been careful to distinguish the Turkish and Arab national character, and the former has thus had the advantage of the virtues of the latter, which has received in return the odium of the other's vices. The remarkable characteristics of Arab character are high honour, generous hospitality, and humanity, coupled with much direct in small matters not connected with points of honour, carelessness as to religion, though not irreligion, and the too frequent excesses of womanly love. The Turkish character is as strongly marked by treachery, often of the blackest kind, little hospitality, pecuniary indifference to strangers, cruelty and disregard of human life, bigotry as to their religion, which is now giving way to democratism, and the same love of plunder which is so common among the Arabs, as well as darker vices unknown to them, which have rendered the Turkish name a by-word in the East, as well as in the West. The conquistadores of the Arabs were not marked by desperation; their rule preserved the philosophy of Greece, which was welcome at the court of Bagdad when it was known in Europe. Arab art was contemptible, and so was its manufactures. Athens, Alexandria, and Antioch; the arts have decayed. Until they held Egypt and Mesopotamia, these were the richest countries of the world, now they are half deserts. All these are facts which can be proved.

Vegetable Products—Egypt differs from most other countries in having neither woods nor forests. Besides the palm groves, we rarely see even a grove of trees, except in Lower Egypt. The largest common trees are acacias, sycamore-fig-trees, and mulberry-trees, all of which are frequently planted on each side of the great roads near Cairo; and the most beautiful trees are the date-palm and the banana. The beauty of the country is caused by its variety of date-palm; for its lowest branches are annually cut, which causes it to grow high, and renders its head of elegant form. When wild, this tree has a far inferior appearance, being low, and having long ragged branches reaching to the ground; and its dates are small and poor in flavour. The Turkish date is a very different tree, having two great branches, each of which divides into two other branches, a subdivision which continues still farther. The weeping-willow, myrtle, elm, and cypress are found in the gardens and plantations, with various trees bearing the fruits to be next mentioned; and the tamarisk is to be seen everywhere.

The most common of the fruits are dates of various kinds, which are sold half-ripe, ripe, dried, and pressed in their fresh most state in mats or skins. Many different sorts are enumerated as known in Egypt. The dependencies produce, and not Egypt, the produce of the lower dates. The hotter and drier climates of the Oases and Lower Nubia best suit the date-palm; and the pressed dates of Seewah, the ancient Oasis of Jupiter Ammon, are among the most esteemed. The grape is a common fruit, but wina is not made from it on account of the prohibition of Mohammed. The Fayoum is celebrated for its grapes, and chiefly supplies the market of Cairo. The most common grape is white, of which there is a small kind far superior to the ordinary sort. The black grapes are large, but comparatively tasteless. The vines are trained on trelliswork, and form agreeable avenues in the gardens of Cairo; but little attention is paid to their culture, the common fault of Egyptian agriculture and gardening, due to the generosity of nature and the indulgence of the inhabitants.

The best known fruits, besides dates and grapes, are figs, sycamore-figs, and pomegranates, apricots and peaches, oranges and citrons, lemons and limes, bananas, which are believed to be of the fruits of Paradise (being always in season), different kinds of melons (including some of aromatic flavour), and the refreshing water-melon, mulberries, Indian figs or prickly pears, the fruit of the lotus, and olives. Many of these are excellent, especially the figs and melons. The trees and plants which produce most of them are chiefly confined to the gardens. The cactus bearing the Indian fig is extremely common, and forms the hedges of gardens and plantations.

The general plan of an Egyptian garden has been already described. Although seldom in good order, such a garden is often picturesque, having a few date-palms and bananas, and perhaps overlooked by one of those houses of the old style of architecture which are rapidly disappearing. No great variety of flowers is cultivated. Among the more usual are the rose (which has ever been a favourite among the Arabs), the jasmine, narcissus, lilac, hydrangea, chrysanthemum, convolvulus, geranium, dahlia, basil, the hibiscus plant (Lavonos alba, or Egyptian privet, which is said to be a flower of Paradise), the helianthus, and the violet.

The vegetables, &c., are very common and of various kinds, so that we cannot enumerate the Children of Israel longed for them in the desert. The principal are beans, pease, vetches, lentils (of which a pottage is made, which is the common food of the Nile boatmen), lupins, chick-pease, the loobiribh (Dolichos lubia), fenugreek, mallow, the baimyl (Bissicous esculentus), spinach, waterlily,
melookheeyeh (Corolars otiorius), leeks, onions, garlic, celery, parsley, chicory, eres, radishes, carrots, turnips, cole-casns, lettuce, cabbage, fennel, gourds and cucumbers (both of several kinds), the tomato, the egg-fruit or badgin (black and white), caraway, coriander, camum, anised, and red pepper.

The chief field-produce is wheat (which is more grown than any other kind of corn), barley, several sorts of millet, maces, rye, oats, clover, peas, the sugar-cane, rues, two species of the tobacco-plant, and cotton, now largely cultivated. The sugar-cane is extensively cultivated, and excellent sugar is manufactured from it. There are fields of roses in the Fesoum, which supply the market with rose-water. The tobacco produced in Egypt is coarse and strong compared with that which is used by the middle and upper classes and imported from Syria and Turkey. That of Syria is considered the best. Of textile plants, the principal are hemp, cotton, and flax, and of plants used for dyeing, bastard saffron, madder, wood, and the indigo plant. The intoxicating hashsheeh, which some smoke in a kind of water-pipe formed of a cocoa-nut, two tubes, and a bowl, seldom used for any other narcotic, is not, as has been erroneously supposed, opium, but hemp. The effect is most baneful. The leaves of the hemp plant are used to impart a bright red colour to the palms of the hands, the soles of the feet, and the navel of both hands and feet, of women and children, the hair of old ladies, and the tails of horses. Indigo is very extensively employed to dye the shirts of the poorer classes, and is, when very dark, the colour of mourning; therefore, women at funerals, and generally after a death, smear themselves with it. Oil is extracted from the seeds of the cotton plant, hemp, calewort, the poppy, the castor-oil plant, sesame, and flax.

The high coarse grass called balfeh (Poa cynosuroides) grows in great quantity in waste places and among ancient ruins.

Many kinds of reeds are found in Egypt, though, if we compare the representations in the ancient tombs with what we see in the present day, it is evident that they were formerly much more common. That they should be wasted away was prophesied by Isaiah (xxix. 6, 7). The famous bylius, or papyrus, from which paper was manufactured, appears to be nearly, if not quite extinct, since Sir Gardner Wilkinson had never seen it (Mod. Eg. and Thebes, l. 441). M. Delile, in his excellent account of the Egyptian flora, merely mentions it by name in his list as the Cyporum Papyrus, called in Arabic Papiru and found at Damieta, but gives no figure of it. The lotus, greatly prized for its flowers by the ancient inhabitants, is still found in Egypt, though it is not common. The French naturalist above mentioned enumerates three species which formerly grew in that country, one with white flowers, another with blue, and a third with rose-coloured, the last of which is now extinct there. On the botany of Egypt, see Bossier, Flora Orientalis, in progress.

Animals.—The zoology of Egypt is not of remarkable interest, although it contains some very curious points. The absence of jungle and of forest, and the little cover thus afforded to beasts of prey, as well as other wild animals, partly causes this, and we observe few birds of beautiful plumage for the same reason.

One of the most characteristic of the beasts is the camel, which is more at home in the dry climate of Egypt than elsewhere out of his native deserts. It has been remarked, however, that the camel, like his master the Arab,

degenerates when removed into a city or a cultivated tract, that the former commonly becomes mangy, and the latter experiences a physical and moral degradation. The Egyptian camel is of the one-humped kind, which has been erroneously called the dromedary, whereas the dromedary is merely a swift camel standing in the same relation to the ordinary camel that our saddle-horse does to our cart-horse. Camel’s flesh is for the most part eaten only by the peasants and the Arabs of the desert, by the Copts it is considered unlawful food.

It is very remarkable that no representation of the camel has been found in the sculptures and paintings of the Egyptian monuments, among the very numerous figures of the animals of Egypt both tame and wild, and of those brought from foreign lands as presents. It does not appear to have been introduced into other African countries until after the Christian Era (comp Desmoulins, Mém. du l’Institut, 28 juin 1823), but it was known to the Egyptians, although it is by no means certain that it was one of their domestic beasts. Two passages in the Bible which speak of camels in the possession of Pharaohs (Gen. xii. 16; Ex. ix. 3) refer to the time at which foreign tribes had been settled in Egypt; and perhaps the camel was peculiarly the animal of one or all of those tribes, and, as they were hated by the Egyptians, it may have been omitted in the representations of the monuments.

To modern Egypt the camel is very valuable, since the traffic with Syria, Arabia, Western Africa, and Ethiopia is to a great extent carried on by caravans. But the ancient Egyptians appear to have derived their wealth more from tributary presents than from commerce, to have allowed their land commerce to be much in the hands of foreign merchants, like those who brought Joseph into Egypt, and to have left even their sea commerce partly at least to foreigners.

The horse is not known to have been used in Egypt before the time of the Empire. Thenceforward the horses of Egypt were famous, and the armies of the Pharaohs were noted for their war-chariots. From Egypt, Solomon, and in his time the kings of the Hitites and the kings of Syria, had horses and chariots (I K. vi. 28, 29). And long after, when first the kingdom of Egypt was divided, and then that of Judah endeavoured to throw off the yoke of the great kings of the East, and made alliance with Egypt, they put their trust in Pharaoh’s horses (Isa. xxxi. 1). In the representations of battles fought by the kings of the Empire we see no Egyptian cavalry, but only chariots, called “horse” in the inscriptions. At later times they may have had cavalry, properly speaking, of their own, and perhaps at all times among the mercenary or auxiliary forces.

In the present day the horses of Egypt are of a very indifferent breed, and the best that one sees in that country have been brought from Arabia and Syria, but these are seldom of great excellence. It is indeed surprising to find few really good horses in a country bordering on Arabia, and long after, when the Arabian horse was still more remarkable, though not during the existence of the Mamelukes, the finest Arabs, however, are kept in the background by their possessors, partly for fear of the “evil eye,” and partly, in the case of all but the highest dignitaries, to avoid their forcible seizure by those of greater rank and power.

The Egyptian ass holds a middle place between that of Great Britain and the wild ass, which is more swift of foot than the horse. It is tall and handsome, docile, and having excellent pace, particularly a quick and easy amble. Thus it is well suited to the narrow streets of the towns of Egypt, and is therefore commonly used for riding by persons of the middle and lower classes. The mules are
The cattle are short-horned, rather small, and, as of old, very beautiful, speaking artistically. They are exceedingly quiet in disposition, and much valued for agricultural labour by the people, who therefore very rarely slaughter them for meat, and then only for the Franks. Buffaloes of an uncoffined appearance and of a dull black, or reddish-brown colour, strikingly contrasting with the neat cattle, abound in Egypt. When voyaging on the Nile, one often sees them standing or lying in the river by herds. They are very docile, and the little children of the villagers often ride them to or from the river. They are sometimes slaughtered, but their flesh is tough and coarse. Sheep (of which the greatest number are black) and goats are abundant in Egypt, and mutton is the ordinary butcher's meat. Swine are very rarely kept, and then almost wholly for the Franks, the Copts generally abstaining from eating their meat. It appears that the ancient Egyptians, though not forbidden this flesh, rarely ate it, perhaps because it is extremely unwholesome in a hot climate.

The Muslims consider dogs unclean, and therefore those of Cairo and most of the towns are half-wild and without masters, living upon offals, and upon food thrown to them by humans persons. In the villages, however, and particularly in the Thebais, their case is better, for they are kept as guards to protect live stock from thieves, and from hyenas and other wild animals, which come from the deserts by night in quest of prey. The common dog of Egypt is generally of a sandy colour and strong, though not remarkable for courage; but in Upper Egypt, about Thebes, there is a fierce breed of dogs with wiry hair, generally black, and much esteemed for courage by their masters. Cats are as numerous in Cairo as dogs, and many of them are as homeless. They are, however, liked by the natives, who assign as their reason that Mohammad was fond of cats. This may perhaps be regarded as a relic of the veneration in which they were held by the ancient Egyptians. It is not a little curious, that there is at Cairo a royal foundation for the support of destitute cats. The author of this charity was the famous Meenlook sultan, Ed-Dabhir Beyhur, whose humane intentions have of late years been sadly neglected by the trustees.

The wolf, fox, jackal, and hyena chiefly inhabit the deserts and waste places of Egypt, and lurk in the ancient tombs and deserted quarries. The wild cat is also found in that country, though it is not common. The weasel abounds in Cairo, and is proverbial for its mischievous and revengeful disposition, and rats and mice are not among the least of the plagues. The hoopoe, jorzus, hare, and hyrax are likewise natives of Egypt or its deserts, and the tame rabbit is kept for food.

The beasts of the chase of the Egyptian deserts are antelopes of various kinds, and the wild ass, esteemed by the Arabs and Persians to be the prince of game, which is found in the southern part of the Eastern Desert. The most beautiful of the antelopes is the gazelle, which is often tamed and kept in the large courts of the houses of Cairo. In Lower Egypt, principally in the desolate marques near the Mediterranean, the wild boar is found and occasionally hunted. It is, however, a timid animal, so that the sport is not, like boar-hunting elsewhere, exciting and dangerous.

From the representations in the tombs we see that in old times the hippopotamus was one of the wild beasts of the country. It has now retreated above the First Cataract, the southern boundary of Egypt. The crocodile has retreated in the same manner, and instead of being found throughout the Nile in Egypt, is rarely seen even in Lower Nubia. The name of the island of Elphanta, situated a little to the north of the First Cataract, bearing the same signification in hieroglyphics as in Greek, makes it probable that at some remote period elephants were found in Upper Egypt, though now they are not seen north of Abyssinia.

In exploring the tombs and dark parts of the temples the traveller is annoyed by crowds of bats, which extinguish his candle, fly into his face, and cling to his clothes, sometimes rendering examination impossible without a lantern. One species is very large, but the common one is small.

Birds of prey are numerous in Egypt, and of many kinds. Of the most remarkable are three species of large naked-necked vultures—the Arabian, the sociable, and the fulvous; as well as the smaller species called the aquatic vulture. The aquatic vulture has a feathered neck, and when standing is by no means a handsome bird, but it is much to be admired when on the wing from the contrast of the black and white of its plumage, and the steady manner in which it soars in circles. Perhaps the bearded vulture breeds in the most lofty parts of the desolate mountains of the Eastern Desert; for when the French army was in Egypt, one of these birds was killed. It is said to have been of extraordinary size, measuring more than 14 Parsee feet, or more than 15 English, from point to point of its expanded wings. Several species of eagles and falcons, two kinds of hawks, the common buzzard, and the moor-harrier live in Egypt, or visit that country, according as they are migratory, erratic, or sedentary. The common kite abounds at Cairo, and is one of the chief scavengers of the city, the others being the crow, the aquatic vulture, the half-wild dog, and the cat. The ruins and tombs of Egypt, and the modern houses, scarcely ever in perfect repair, shelter owls of various kinds.

The Spanish sparrow, which differs little from that of Britain, the wader-wagtail, linnets, and larks are among the birds of Egypt. The kind of kingfisher which is commonly seen on the Nile, perched on some eminence, and darting suddenly to seize a fish, is very inferior in its plumage, which is speckled, black and white, to the common kingfisher, which is also occasionally seen. The beautiful hoopoe is among the least rare birds, and there are also three species of bee-eaters. The hoopoe may be often seen in Cairo, where it is regarded with some reverence, as the bird of Solomon. Crows of the kind which we call the Rostam crow are very numerous at Cairo. Birds of the swallow tribe, the wood pecker, and the cuckoo are also known in Egypt.

In the metropolis, in the towns and villages, and in the fields, no bird is more common than the pigeon, tame or wild. Pigeon-fancying is a favourite amusement of all classes at Cairo, and in the villages the pigeon-houses are often lofter than the huts upon which they are raised. Tourists on the Nile inflict great loss on the poor peasantry by recklessly shooting these tame birds. Wild turtle-doves build in the courts of the houses of the capital. These courts often serve for the purpose of poultry-yards, in which fowls wander about without any care being taken of them, except that food is occasionally thrown to them. They are consequently meagre, and produce very small eggs. Turkeys, ducks, and geese are kept in the same manner.

Quails migrate to Egypt in great numbers; and sand-grouse, called by the natives kats, from their cry, are common in the deserts. There also the Arabs, like the ancient Egyptians, hunt the ostrich. A red-legged partridge is likewise found in Egypt.

The islands of the Niles, the sand-banks which appear when the river is low, the lakes and marshes, the sheets
of water caused by the inundation, and the mountains near
the river, are the favourite resorts of many kinds of wading
and of web-footed birds.

Of the waders the most interesting would be the sacred
bird of Egypt, if that bird be now found there. But it does
not appear certain that only one species was anciently held
sacred, and if so that this is the ibis religiosus of Cuvier
now known in Egypt. The Egyptian plover is famous on
account of the story, which modern observation has con­
formed, related by Herodotus respecting it and the croco­
diles which accompany it. Of these the most common waders are the spur-winged
plover, the snow-white egret, which has been erroneously
called the ibis, and the pelican. The cormorant, too, is often
seen, as are wild geese and ducks, both of several kinds.

Of the many reptiles the crocodile occupies the first
place. It is seldom observed in the present day in Upper
Egypt. Some years ago it was usual south of Asyut
to see several crocodiles basking in the sun in the heat
of the day on a sand-bank, at the approach of a boat
they would quickly plunge into the stream. They rarely
attack a human being, but it is usual to bathe in the
river, at places where they are reputed to be fierce, and
to bathe at any distance from a boat in the part of
Upper Egypt where they are found. It is said that the crocodile’s
common mode of attacking a person on shore, who is near
the river’s edge, is to approach stealthily and sweep him
into the stream by a blow of his tail, the great weapon of
all the lizard tribe. The smaller saurians are found in
great numbers: of these a species of chameleon may be
mentioned.

Serpents and snakes are among the most common
reptiles, and are of various kinds, including the deadly
cobra and cobra di capello. The house snakes, however,
which are numerous at Cairo, are harmless.

Fish abound in the Nile and in the Lake Menzaleh.
The modern inhabitants of the country are partial to fish
as food, but they say that only those fishes which have
scales are wholesome. The fishes of the Nile are generally
insipid in comparison to those of the sea; though a few of
them, particularly the bultee (Lobius nileoticus, Linn.),
the kush (Percia niloticus), and the bimne (Cyprinus bimne,
Arct.), are of a delicate flavour.

One of the commonest insects is the dangerous scorpion.
Its sting is very painful, and, if no remedy is applied,
sometimes fatal, particularly if a person is stung in the
heel. Large spiders are abundant, including more than
one species of solpugus, incorrectly called tarantulas by
the Europeans, and believed by the natives to be very
venomous, but this is most likely an error. Egypt has ever
been famous for what may be termed insect plagues, but
not to the extent that has been asserted by some
travellers. Caution will enable one partially to escape the
attacks of fleas and bugs, and altogether to avoid the
more dreaded insect usually spoken of with them.

Bees are kept in Egypt, and their honey is much prized
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Bees are kept in Egypt, and their honey is much prized
by the inhabitants, who usually eat it in a clarified state.
It is inferior to that of England, and also to the famous
Greek honey. Butterflies and moths of many kinds are
observed in the fields. There are plantations of mulberry
trees in the eastern part of Lower Egypt, for the rearing of
silkworms. The manufacture of silks was a Government
monopoly, but has lately ceased to be so. The silks of
Egypt are generally inferior to those of Syria and other
Eastern countries, though some have been produced of
great excellence. Among the other insects may be men­tioned the common fly, rightly deserving a place among
the plagues of Egypt, as also the mosquito, which, how­
ever, is not found throughout the country.

Ancient Inhabitants.—In the following remarks on the
ancient Egyptians great assistance has been derived from the
valuable work of Sir Gardner Wilkinson on their
Manners and Customs, which has made us better acquainted
with them than we are with any other people of antiquity.
From the representations of their monuments, and from
the nummules which have been unrolled, we can form
an accurate idea of the personal characteristics of the
ancient Egyptians. In consequence of a misconception
of a passage in Herodotus (iv. 69), and confused notions
respecting the inhabitants of Africa, it has been often sup­
posed that the Egyptians were very nearly allied to the
gnito race. A careful examination of the most distinct
data in our possession has, however, produced a far different
result, and it is now acknowledged that they were more
related to the Caucasian than to the negro type. It has
also been shown that most of the modern inhabitants have
preserved many of the characteristics of their ancient
predecessors, and that it is, therefore, erroneous to suppose
that they are chiefly of Arab origin, although the internes­
ture of Arab blood has so much changed the national
type that it would not be safe to describe the earlier
people from the appearance of the present. Neverthe­
less, one is often struck, among the remains of ancient
monuments, by the similarity of an early representation to
some one of the natives standing by, placing himself upon
an Arab origin, and repudiating the reproach that he is of
the race of Pharaoh.

Judging from the monuments and mummies, the coun­
tenance of the ancient Egyptians was oval, and narrower
in the case of the men than of the women. The forehead
was small and somewhat receding, but well-shaped; the
eyes large, long, and generally black; the nose rather
long, and with a slight bridge, the mouth expressive, with
rather full lips, and white and regular teeth, the
chin small and round, and the cheek-bones a little prominent.
The hair was long, full, curly, somewhat harsh, and almost
always black. The beard was worn in so artificial a mode
that one cannot judge whether it was full or not. The
skin of the men was dark brown; that of the women
varied from olive to pinkish colour in different persons.

The colour of the women was natural, and the darker hue
of the men the result of exposure to the sun, and the
scantiness of their clothing explains why their faces were
not darker than the rest of their bodies.

The dress of the ancient Egyptians did not much vary
at different periods. Under Dynasty IV. it was, however,
simpler than under the Empire. As most monuments re­
mained of the Empire, the dress of the inhabitants at that
time will be described, and this description will apply, in
its main particulars, to the earlier and later times of their
ancient history.

The men of all classes either had shaven heads, with
skull-caps, or wore their own hair, or wigs, very full, and
in numerous plaits or curls, falling to the shoulders, but
sometimes much shorter and in the form of a bag; there

A little spearmint, made into a paste with water and applied
externally to the place stung, has produced, in the many instances in
which the writer has known it used, almost instant relief.
is, indeed, reason to suppose that the practice of shaving the head was universal, except among the soldiers. All the hair of the face was also shaved, except in the case of kings and great persons, who had a small formal beard, possibly artificial, beneath the chin.

The king was distinguished from his subjects by the richness of his apparel. His head-dress was sometimes his own hair, or the wig, alone; and at others he wore the high crowns of th and Lower Egypt, the former being a kind of conical helmet, and the latter a short cap with a tall point behind, worn outside the other. He is also occasionally represented with another form of high cap. The figure of an asp, the emblem of royalty, is often tied just above his forehead. His beard was about three inches long, and one inch broad and deep, and formally planted.

The simplest royal dress was a kilt, usually reaching nearly to the knees, rather full in front, having a girdle above, from which hung before a broad band, richly ornamented, and peculiar to the king, like the lion's tail (natural or artificial) which was attached to it behind, and reached nearly to the ground. Sometimes a large and full skirt was worn over the kilt, descending almost to the ankles, and having wide sleeves reaching to the elbow; this outer dress is occasionally simply a skirt. Both these dresses were usually of white linen, and the outer dress was apparently fine and transparent. Sandals were worn on the feet, and the ornaments were armlets, bracelets, both flat and broad, and deep necklaces.

The ordinary costume of men of the upper and middle classes was the same as that of the king, the short kilt, with sometimes the long skirt or skirt of fine linen above it, tied in various forms. Their beards were very short, scarcely exceeding an inch in length, and of a formal square shape, and they wore the full hair or wig, or a skull-cap. They generally went barefoot, but sometimes used sandals.

The priest was occasionally clad in a leopard's skin, either tied or thrown over the shoulders, or worn as a shawl, the fore-legs forming sleeves. Military persons are often represented with helmets, and sometimes with short coats or corslets of plate-mail. The royal princes were distinguished by a side lock apparently curiously plaited.

The dress of the queen consisted of a tight skirt, the waist, supported by shoulder-straps, and bound nearly to the ankles. It much resembles that of the queen's of kings and great persons, who had a small formal beard, possibly artificial, beneath the chin.

The children of all ranks were very simply dressed, when clad at all, though those of rich persons were sometimes attired as their elders. Boys were distinguished by the side-lock, which the princes, as before mentioned, wore in a peculiar fashion.

Religion.—The credit which the Egyptian priests enjoyed in antiquity for a knowledge of philosophy led to the expectation among modern scholars that, when hieroglyphics were read, the world would recover a lost body of human speculation. The first results disappointed this expectation, but later studies have gone far to justify it. The statement of what those studies have achieved may be divided into two main subjects—the teaching as to the gods and that as to man's duties and destinies, rites and ceremonies coming under both heads.

Had the Egyptians any idea of one God—in other words, is their religion a complex structure raised upon a recognized monotheistic foundation? The Egyptian religious writings are held by M. de Rouge to give an affirmative answer to this question. They speak of one supreme being, self-existent, self-producing, the creator of heaven and earth, called the double god or double being, and the parent of a second manifestation. From the idea of a supreme deity, at once father and mother, producing a second form, probably originated a first trial like the triads of father, mother, and son frequent in Egyptian mythology. To the local divinities the attributes of this supreme deity are given, as though they were mere personifications: that they were originally so is, however, not certain. Ra, the sun, is indeed spoken of as this supreme being, but this appears to have been a later phase of opinion. (De Rouge, "Etudes sur le Rituat Funéraire," Rev. Arch., n.s., l. 356 seqq.) It was probably an attempt to substitute a popular materialistic belief for a philosophical creed. A significant instance of this tendency is perhaps in the endeavour of a king of Dynasty XVIII. to abolish all worship but that of the solar disk—sun-worship in its most material form.

A very ancient moral tract, the papyrus of Ptah-hotep, composed under Dynasty V., although a purely Egyptian work, mentions Osiris and a divinity who may be a form of Osiris, yet speaks constantly of God as if the author had the idea of one God.

It also appears from one remarkable fact that this idea prevailed in Egypt before the conversion of the nation to Christianity. The Copts took care to eliminate from their vocabulary all the words connected with the religion of their forefathers, substituting for them Greek equivalents. Their term for God is, however, not Greek but Egyptian, NOY;[1], the hieroglyphic neter. They also used it for heathen objects of worship, god or goddess. These uses must therefore have been prevalent in the vulgar dialect when it was first written in Coptic.

Though it cannot reasonably be doubted that the Egyptians had a distinct idea of monotheism, this idea was mixed up with the basest polytheism. The double character which we perceive in the race and the language, both partly Nigritian, partly Semitic, is equally evident in the religion. Every town in Egypt had its sacred

animal, or fetish, and every town its local divinities. As the animal worship was associated with higher ideas by the union of an animal's head with the body of a man in the figures of divinities, so the local divinities were connected with the monothestic idea by intermediate forms, principally identifying them with Ra, who thus was the generally received form of the notion of one god. According to this view monotheism was not the parent of polytheism, but in a later phase connected with it.

Another great change affected the essential ideas of the Egyptian religion. For many centuries Seth, specially the divinity of Lower Egypt, who seems to have represented then, as certainly afterwards, the destructive power of nature, held a place in the Pantheon, although regarded as the adversary of Osiris and thus of mankind, whom, however, he finally befriended. He seems thus to have had a character of necessary evil. At length, after the Empire, he was expelled from the Pantheon. This may have been because the worship of Seth was repugnant to a reign whose house of Asiatic origin, which might have held the Pantheon which identified physical and moral evil. It may have been because Seth had been considered to be the divinity of the eastern neighbours of Egypt, and with their success and the fall of Egyptian supremacy had come to be thought hostile to that country. If this were the case, the kings who proscribed his worship could have had no relation to the notions supposed to reverence Seth. In effect the change identified physical and moral evil and destroyed the earlier philosophical notions on the subject, besides introducing some confusion into the theanthropic speeches of orders of gods. Manetho of divine dynasties. The explanation is to be found in the worship of each town of a cycle of gods. This cycle is called "the society of the gods," or "the nine gods." M. de Rouge does not admit the second rendering except as a plural of excellence ("Études," Rev. Arch., i., p. 237). The number varies at different places and in different lists at the same place, but is always nearly or exactly nine. The Egyptians themselves explained this cycle as the self-development of Ra; the other gods were in the view of his tributes (De Rougé, l.c. 236, 237, Râ. xvn. 2, 3). Two orns of the cycles acquired the highest importance as representing the systems of the learned men of Memphis and Thebes, the successive great capitals of Egypt. The two systems are thus given by Professor Lepsius:

MEMPHITE SYSTEM.

1. Ptah (Phô, Ἱππος). II. Amon (Ἀμών, Zôs). III. Mentu (Μεντ.)
IV. Shu (Σου). V. Nut (Νατ).
Shu (Σου; Διδώνω), and (6.) Isis (Ἱσ, Διάσφαρη), and (7.) Set (Σέτ, Τούφ), and (8.) Har (Χάρ, Ἀρεάλω), and
Hat-har (Ἀρεάλ, Ἀρεάλω).

THESAuran SYSTEM.

IV. Shu (Σου). V. Tefnet (Τεφνῶ).

The views of Professor Lepsius on the origin and constitution of these systems, with such modifications as later researches have suggested, may now be given. We first observe that the two systems are but variants, and may be treated as one. They consist of male divinities, most of whom are associated with goddesses. These goddesses hold an inferior place, and are not to be counted in reckoning the number of the order, except perhaps Isis, whose importance is much greater than that of the others. An examination of the various forms of the two systems immediately suggests that they increased in course of time, Ptah and Amen, the chief gods of Memphis and Thebes, having been added for state reasons. The order thus reduced consists of two groups, the group of Ra, and that of Osiris. The group of Ra is wholly of solar gods, the group of Osiris begins with Seb and ends with Hathor. Sebek then stands alone, but he is wanting in the older lists, and is only an addition of the Theban system.

The solar group consists of Ra, or else Mentu and Atum, and Shu Mentu and Atum are merely a division of Ra into his two chief phases, the rising and the setting sun, the sun of the upper and of the lower world. Both are solar divinities (Brugsch, Géogr. Inscr., i. 254.), the solar light, is the son of Ra or of Mentu or Atum, Tefnet, the goddess associated with him, is the daughter of Ra.

The Osiris group is not genealogically connected with the solar gods. The central point of the group is found in Osiris, with his consort Isis and his opponent Sêb. Seb and Nut are merely extensions of the group upwards. They are, however, spoken of as parents of the gods, showing that they represent the commencement of a series Osiris, Isis, Seth, and Nephthys were usually considered their children, and Horus, the child of Osiris and Isis. Hathor is associated with Horus, but her genealogical place is not clear. It is, however, certain that she is of the family of Osiris. The characteristics of this group are predominantly cosmic, this is true of the myth of Osiris, and consequently of the whole group, and is especially evident in the cases of Osiris and Isis, Seth, and Seb and Nut.

How did these two groups come to be united in a single series? Professor Lepsius argues that this was due to the influence of Thamus, the oldest Egyptian royal seat, from which the first historic king Menes came to Lower Egypt and founded Memphis. Thamus at a very early time merged into the more famous Abydos. Abydos was the great seat of the worship of Osiris, which spread all over Egypt, establishing itself in a remarkable manner at Memphis. All the mysteries of the Egyptians and their whole doctrine of the future state attach themselves to this worship. Osiris was identified with the sun, and the union of the two groups was thus not forced. Both had indeed a common origin. Sun-worship was the primitive form of the Egyptian religion, perhaps even pre-Egyptian. The first development was the myth of Osiris, due to the importance of Thamus, just as the rise of Memphis put Ptah, an abstract idea of intellectual power, even before Ra. So the rise of Thebes introduced Amen, who was identified in the form Amanus with Ra, and as an intellectual principle placed before the physical solar powers. This argument derives great weight from the relative position given to the two groups, the solar divinities coming first, and from the circumstance that the religious reform under Dynasty XVIII. suppressed everything but material worship, as though this had been the primitive belief of Egypt. 3 M. de Rougé, in his examination of the Egyptian Ritual, comes to a similar but more definite result in treating

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1 These have been called the systems of Memphis and Thebes. The solar cycle of Memphis was, however, not the system of Manetho which has been called Memphis, and has a distinct local character (Brugsch, Géogr. Inscr., i. p. 237).

2 Shu, true spelling since discovered, is here put for Μα.

3 See Lepsius, Uber den ersten ägyptischen Göterzweck und seine geschichtlich-mythologische Entstehung" Ber. Akad., 1851.
of the mythological elements of the important seventeenth century. He traces the solar gods to Helopoli, and considers the Osiris myth as probably derived from Aybodis, and added at a later time. Professor Lepusus does not admit the Helopoliapolis as of the solar group of the Osiris myth and political importance of Helopolis. Yet the circumstances that the chief divinities of that city, which had the sacred name Pe-ram, the abode of Ra, were Atum, Shu, and Tefnet (Rel. xvii. 4, Ap. Dragash, Geogr. Inscr., i. 254, cf. 265) seems to conclude.

Some account may now be given of these divinities in the order of the lists, the later additions being noticed last and then lesser divinities. It will be impossible to give more than the simpler particulars, and many names in the Pantheon must be omitted altogether.

Ra, the sun, is usually represented as a hawk-headed man, occasionally being represented on his solar disk, round which the uraeus, symbol of royal power, is sometimes coiled. His symbol is either the solar disk or the hawk. Ra held a most ancient and Egyptian divinity, except Osiris. The worship of Osiris under his own name was more common than that of Ra under his, but this was in some degree compensated for by the union of Ra with other gods under solar names, such as Amen, Num, Seked, forming the composite divinities of Amen-ram, Num-ra, Seked-ram (Lepusus, Rel. Aeg. Gg. Geter., i. 356). In the religious paintings he is the supreme being, carrying on his course a constant warfare with evil, and triumphing over evil, represented by the great serpent Apopis, a wholly evil being, not a divinity. His career resembles that of Osiris, but with notable differences. Ra is purely solar. He is nearly associated with any concept, and so the sacred pens are called a female Ra (Lepusus, Rel. Aeg. Gg. Geter., i. 325). He is always victorious. He protects mankind, but has nothing in common with them. Osiris on the other hand is only solar because he is the beneficent power of nature. He is constantly associated with Isis. He has a life-long conflict with a malignant power, his brother or son Seth, who is not wholly evil. Vasequesh and killed he receives his life and wins, but it is rather Horus his son who wins, and Horus, a sun-god, is the direct link with Ra in the Osiris family. Osiris protects mankind because his life resembles theirs. If he did not live on earth, at least his tomb was shown there. At Helopolis two animals sacred to Ra hesitated, the black ibis, the emblem of Osiris, and to Ra, Atum, and the Phaemon (Bennu) sacred to Ra. Both are connected with Osiris, the bull by the worship of Apis at Helopolis, the Phoenix by the representation of Osiris as the Bennu. In ch. xvi. 227, 225. In addition the sacred Phoenix was reverenced at Helopolis.

In the attempt under Dynasty XVIII. to establish sun-worship in an original or ideal simplicity, the only representation is the solar disk with the uraeus entwined round it, and rays ending in human heads, one of which holds the symbol of life to the worshipper. The great sun-temple then founded no status whatever (Lepusus, Rel. Aeg. Gg. Geter.).

Meniu and Atum may best be noticed together as merely two phases of Ra, representing, as already stated, the rising and the setting sun, the sun of the upper and the lower world. Their twin-character is seen in the circumstances that Meniu was worshiped at Southern Am (Hermouthis) and Atum at Northern Am (Helopolis, the On of the Bible). Meniu, or Menf-ta, is represented as Ra with the head of a hawk, as Atum in a human form. Atum and Meniu cannot be distinguished from Ra except that probably their attributes were more restricted, and Meniu seems to have been limited to what the human form of Atum may perhaps have a relation to Osiris 9.

Shu is, however, not mentioned among the divinities of Helopolis in the great Papyrus of Harnes III. Records of the Psa., vs. 35 seqq.

9 In the 17th chapter of the Ritual the justified dead is called in his new condition Tm, equivalent to Atum. This may be merely

because the word Tm has the same meaning, and may be thus a play upon the name of the divinity (of De Rouge, "Etudes," 350, 351), but it is likely that Tm is here used as Osiris everywhere to indicate the divine quality of the justified.
.JOION.]

E GYP

,enh), the dIVIne worlu below (Ker'neter), to be protected by bim
lelr confhct \\ Ith Seth and hlB genu, anu to have their final state
nnmoo by him M thelf Judge It was to Osms that the prayers
offermgs for the dead were made, and all sepulchral mscn£,s, excellt those of the oMe.t pPTlod, are dllectly aduressed to
• As 81S 18 a form of the female pnnclple, OSll1S, the aun anu
! Nile, W!lB consluereu ID one phase to be the male pnnclple.
Osms of lII,nues was the name of tlllB fonn whICh was more
cll~l1y known by the name of Mendes
'
he three most famous of those more sacred ammals which were
,hlppoo as mdlvlduals, not as a class, were the bulls AplB anu
, V1'& anu the lIenueslnn goat
Of these Apis and the Mendeslan
were connected with the worshIp of OSlr1S lIlanetho says tbat
hese ammals Were first reckoned anion~ tbe ,!oUs under a very
I EgvptIan Pbaraoh, Kalech6., III Egyptian Ka-kau, second king
yn II I It IS very charactemtJ.(, of the EgyJltIan religIOn that
reverence for OSUIB shoulu have taken thlB gr08s1y-matena:
1e bull Apis, who \lears in Egyptian the same name 1\8 the Nlie,
I, was worslllpped at Memphis Here M .IIIanette dlsconred
les of the tombs of these bulls, With tablets recorumg the reign.
hleh they were bUl,ru, anu m spverul cases further exact parlars of dnte, thus affordlllg 1m portant chronologICal eVidence.
, was conSidered to be the livmg emblem of OSlrlB, and was thuq
.ected with the sun and the Nile. and the chronolOgIcal aspect
I lth explam8 hiS belllg also connected With the moon.
011 the
h of an APIS, a successor was sought for and recogmzpd by
,<m malks He was then lnaugulated and worshipped during
IfctlIne (Ree AI'ls )
rapls. or Sarapls, m Egyptmn Hesiri-HapI, is the defunct
, who ha. become OSlrlS The gTeat extensIOn of the worship
arapls, after the Impol tabon of Ins statue by Ptolemy I, WlUl
Iy a development of long eXisting EgYl,tmn Ideas Honce the
spread and gIeat popularity of tlus worship (8ee SERAPlh )
Ie Mende .. an goat had no speclIIl name He IS called the Ram.
vas conSidered an emblem of Ita and Shu as \\ell as of Seb and
IS, but plobably he was chiefly sacred to OSiriS, and m hiS solar
ct, whICh "ould thus IntIouuce the relatIOn to the more
, ",euly s"IM (lods The seat of Ins wOlshlP was lIlendes III the
Jrn part of tlle Delta, \\ hele Dr Bmg.ch has discovered" vel V
· testing stele of the reign of Ptol6my 11 • Phlladelphus, gIvmg
tllstory of the fin<1111g allllmaugnratlon of a bacred ram. and of
, honour paid to hun all,l to h,s temple. HIS worship was SimIlar
lat of Apls. IJllt of a glOsser form, lllRsmuch as the goat or ram
a symbol of the plOduthve force of nature t
IS, or Hes, represented as a womnn beallng on her head her
lem the tluone, or the 80lRi disk and cow's horns, IS tile female
• of OSlllS Ullhke Ra, the Osms famllv have eensorts, but no
,IS so ulshnctly as ISIS a couutel pal t anu of equal Importance.
ugh the plnte of ISIS IS not as Significant lIS that of Osms ID the
: h to wInch they belong, she IS necessary to It, Rnd thiS IS prof y the rea._on why she attRllwu an Importance beyond the othol
I pltan goddesses except only Hathor, who IS but allother ISlS.
· th, the Egyptian Set, llSIt.llly callett by the Greeks Typhon, is
_'sonted With the head of a fabulous ammal, havm~ a pomted
t and hl'lh square enrs He \\as the brother or son and oppoof Osms, the dll'llllty of the enemies of Egypt, and the chief
Ie powels which fought '''th the human SOUIID the after hfe
e!'taml)' )eplesfnti phYSical evil It would be easy to accollnt
liS worslllll m Egl'\lt "ere It not for hiS appearlllg as the enemy
lds as we 1 as of men There IS Indeed sometlnng IllOgIcal III
\ IOldlllg a place III the Pantheon, \\ hlCh gams consl.tency by hiS
dSlOn, thougb the cOllsequent confUSIon of mOlal and phYSical
was detumental to ethICal lueas It IS remarkable as showmg
E"ypttan notIOn of Seth" hde he \\ as still worshipped, that lU
· r;'mbs of the Kings at The beq, tho-e whose names are composed
, hiS. Setee I. and II , 8n,1 Set-nekht, use lIlstead the name of
IS ThiS seems to have been somebmes done afterwlUUs by a
',"e 10 thelllserlpllOns, but still at the time when the tombs were
, ~ompleted, and thus wIllie the reverence of Seth, as IS shown

II

'\{ de Rouge has nobceu that the name of thiS kmg, "th. male of
's " or "the bull of bulls," may be connected WIth the cultu! of
· sacred bulls, while that of Bmathrls, Ins succeqsor, contams a
)01 the ram, mtercbllllgeable With the goat, whlcb makes It look
, " ;econd commemoratIVe medal (S,% Prem. Dyn • 243, 244). J!
, be so the names of th ... e emly Pharaohs must have been taken on
- ncce""lOn or on some remarkable event, like the throne·names
the lIltrodt.cbon of that second nllllle A change of nllme dunng
117'9 reIgn for a rehglOus reason 19 seen 10 the case of the sun,~pplllg Amenoph IV.• who took the name of Khu-en-ateo.
_
~eeord3 of 1M Past, VlU. 91 se'l'l ,where the stele of Mendes 1&
,lated.
t has been u,,,al to call Seth the brother of Osms; Dr Brngsch
; rs to style lum hiS son (HI.3I. 2 eeL p. 20, 22). ThiS double
oll,hlP IS the key to the slDlllar POSItion of Horus, and the Identity
.•thor and lSIB.

rr

717

by these royal nam..... was in full bloom (Lepsms, ErBl A rg
GollckreuJ) The &ub""luent change of OplDlOU as to Seth h':'
lUentificatlOn With moral t!\ II, and hIS consequent expulblon fro~ the
Pantheon have been alw.uly notIceu. In consenueuce hiS figIlre
and name are llSually etraced on the mODuments, aud other god. tJke
Ins place In the cycles lD which he h.ul a pOSitIOn In lata hmes
Seth IS the enemy of all goo<1, fe8.1e<1 al1J hateu, b"t no long.r
reverenced. The date of the change IS as jet undetelDllneu. It
hIlS been usually assigned to tbe liubastlte kID;:s ,\110 compose,1
Dyn. XXII III Manette has dIScovered the CUl10lIB fact tllat Olle of
those klllgs, a hitherto unkno\\n O'lOrkon. altered the fi"ure of heth
lD the legends of Ramses II at TanlB to that of a Sct.){a (Jl/U<e
BfYUlak, I' 273) Was tlus the beglDmng of the change I
Nephthys, or Nebtl. the s.. terof OSlflB an<1 ISIB anu consert of
Setl>. does not, as far as the Egyl'tulD document. t~ll us share Ins
character It is rather as the .I.ter qf ISIB that she the~e app"ars,
alulD" her In her labours to recover and reVive OSll"lS. Thus like
lslS s~e IS a protector of the dea<1, and her flgUle and worship escaped
the fate of those of Seth
Horus, or Har, IS lD the cycles the son of O.lnS and Isis There
IS also a Horus the cider, Haroens. Har oer, Ilfother of Osm.• , anu
a Horns the chllu, HaJl)ocrates, Har-p"-khrul1, son of Osms anu IHS,
and two other forms, Har-Hut, the HOIUS of Hut or ApolllDopohs lIfagna. aml Har-em-akhu. "Horus m the horizon" Horn. IS
generally hawk-headed. and thus a soldr god cOllnecteu With lia
ThiS conneetlon IS pel haps strongest lI). the fonn Har-em-akhu,
worsluppcu at Hel.opohs sometimes even as Ra-Har-em-akhu. 'I'he
ml)st mterc:,tllll$ fOim IS that of Homs as the son and anno-er of
Osms Osms ~ClOg idelltlfied WIth the sun of the Dlght Hvrus
IS naturally the sun of the day From thiS luentlfieatlOn a~ose the
Idea of all IDfant Homs as the nsmg sun. As Homs took the
place of Osms m the contest \\ Ith Seth, he tecame the elder Homs,
to be on an equality With hiS opponent, "ho seems oftener the
brother than the eon of Osms Speually HOI us IS the ruler of
Upper Egypt, and the typical king of Egypt as much as Ra It IS
mdeed so hard to <1lbtlOgmsh HoruE flOm Ra that It seems ImpOSSible to hold any opillion but that they had thelf Oll!,'ln In
separate religIOUS sy.tems
Hathol, Athor, or Hat-har, whose name means" the abode of
Homs," IS har<1 to dlOtmgmbh flom ISIs' She was worsiupped With
!SIS at Dendarab (Dunlleh.n, Bauurk1t1!d. de1 TCJnl'clan/agm to"
De1ld..'Ta, 3, 4) and Dr BllIgsch even supposes the local goJ<1ess to
have been Isis-Hathor (Gcoyr Inschr, I 202.203). but tillS he has
n"t proved, for the representahonE and htle. are dltferent for the t\\C
goudesses (el Dumlchen, Ie) The cow was sacleu tt both Hatllor
and ISIS, and both" ear the dISk and cow', horns Hathor 10 the
form of a cow plays an Important part m Amentl (el DumlChen,
~lnd 21, Mallette, Musec .3oltlaq, 118, 119)
CUllou.ly she IS more
Widely reverenced tban e,'en ISIS Sbe IS realiy the female counterpart of Osms She was, like 111m, \\"o ....l1ll'l'e<1 throughout Egl pt,
and the gleat temple of AMoo contams a h"t of ovel tluee hundleu
names of the goddess ID her local forms (Dumlchen, ,b.d 20) Still
more remarkably, m late times, the cow, helC the symbol 01
Hathor, not seldom ukes the pl.\ce of the name ot Osms as appiled
to women deceased mstead of taklDg the fOrln of Osms, they take
that of Hathor (lbld 21) It IS cbaracterlstlc of the Eg) ptlan
religIOn that tillS Irregulanty should occur, and we may well
heSitate to attempt to dehue tbe place of Hatbor lD tbe Pantheon
(Marlette, lJ,LSOe Boulag, 118), though M DumlCben lias Jl'ade
tillS endeavour lD a velY mteresting passage, that coulu be accepted
had he gIven suffiCient autbonty from the monuments, anu not
shown traces of the mlluence of Greek mterpretatlOn, be"ues too
great a tendency to reason on the negative eVIdence of the .Imple
statements of the earlier monuments (Ibtd. 20, .tq'l )
Fhtb .., or Ptsh, the Egvptlan Hephrestus, IS tbe first to be
notIced of the dIvmltles mtroduced mto the chief cycles .utf,r thelf
10nnatlon. Ihs name IS one of the Egvpban wOrUs whICh can be
recogmzed letter for letter m Hebrew (nIJ~ "he opened, began,"
and (Plel) "~arved "), and the sense IS Similar. Ptah IS thus the
dlvme archltect (el Brugsch, HI8Unr<. 2d ed, 21). He was the
chief IfId of Memprus, worsrupped nnder a human lorm, sometImes
as a pigmy, supposed to be an embryo. He was the creative force,
but seemlDgly not as the sun. Though when connected WIth tbe local
fonnof Osms worslllpped at MemphiS under the name Seken-Hesm,
and then called Ptah-Sekel1 HeSIn, he IS sometImes hawk-headed,
thlB IS rather With a reference to Horns tban to Ra. Perhaps
Professor Lt-P'llus'sVlewthat he IS put before Ra m the Memphlte form
of the cycle as an abstract Idea of mtellectual pewerlS the true one.
If so. It seems probable that the WOrshIp of Ptsh was of foreign
orunD.
Ammon, the Egyptum Amen, .. the ruduen," probably owed
his Importance to the greatness of Thebes, tbe cblef ElP"Ptum seat
of lns WOrship. He seems to denve his charactenstlCS from h..
associatIon WIth other gods. .As Amen-ra he tak... the qualities of

« Dumlchon conSlders Bathor as the female pnnCll>le to be ldentlc:J
wnh lsta (B""urA:VIIde """ Dmdera, 20)•


the sun; as Amen-ra ba-nun-‘t, “the husband of his mother,” he
takes his name from Min in Kahun, the goddess of the mother principle. Ramses
II. has the ram-headed form that Greek notions would lead us to expect.

From this the crocodile-headed god, seems to have held a similar place
to that of Min in the Fourth Dynasty. He was at once the guardian of the
monuments of Upper Egypt, and the
Thoth, or Taus, is the head of the second cycle in the two
principal forms of the cycles. As the chief moon-god he thus
takes an inferior place corresponding to that of Ba. He is
generally represented as this-headed, and frequently bears the disc
and crescent of the moon. He is the god of letters and of the
ancient Egyptian thesaurus, where the name Sesennu, also
Sebeus, is found, and to which place. Thoth is called his patron god (Lepsius,
1. 220), but she is not his consort at Hermopolis (Brugsch,
Abode, or House of
The goddess corresponding to Thoth was Nephthys, or Nit, worshipped at
Chemnus, or Thonis, Kebh-net or

Hapi, as already noticed, was the local deity of the ancient
as the sacred bull of the Osiris
shell, of the cat, the latter
Inundation
At Thebes the gods and goddesses of the Sun
at Memphi,

Nelth, or Nit, worshipped at Saos, identified by the Greeks with
Athens, is one of the few goddesses who held the first place in local
worship. From the idea of a supreme being, single and self-
present, as the aspect of a finite power, it is
Nelth, or Nit, worshipped at Saos, identified by the Greeks with
Athens, is one of the few goddesses who held the first place in local
worship. From the idea of a supreme being, single and self-
present, as the aspect of a finite power, it is
private—that of the temples and that of the tombs. Every town had at least one temple dedicated to the chief divinity of the place, with certain associated gods, and usually, if not always, a living symbol in the form of a sacred animal supposed to be animated by the chief local divinity. The services were conducted by priests, and on occasions by the king, and by scribes, who sometimes formed a college and lived at the temples, the various duties of which required the services of learned men. It is probable that the common people had a very small share in the religious services, the most important of which took place in the smaller inner chambers, which could never have admitted many worshippers. The outer courts, and still more the great inclosures containing the whole group of temple-buildings, must, however, have been the chief public resort for business and pleasure. There were no other public buildings, or, apparently, market-places. Like the modern mosque, the temple must have been the chief centre of the population.

The worship in the tombs was not local. It was always connected with Osiris or a divinity of the same group, and had the intention of securing benefits for the deceased in the future state. It took place in the chapel of each tomb of the wedy; and though properly the function of the family, whose members officiated, the inscriptions invite all passers-by; as they ascend or descend the Nile, overlooked by the sepulchral grottos, to say a prayer for the welfare of the chief person there buried.

The sacrifices were of animals and vegetables, with libations of wine, and burning of incense. Human sacrifice seems to have been practised in early periods. The monuments do not mention it, but Manetho speaks of its having been abolished, at least at one place, by Amosis, no doubt the first king of Dynasty XVIII. The reference is probably to some barbarous usage during the great war with the Shepherds.

The origin and destiny of man in the Egyptian religion is now known to us on the authority of its own documents, which in the main confirm what Greek writers had already stated on the subject. The aspect of the Egyptian teaching is either that of a simple theory, which was afterwards mythically interpreted, or of a union of such a theory with a superstition existing side by side with it. In the famous seventeenth chapter of the Ritual it is possible, as De Rongé has done with extraordinary skill, to extract from the text a consistent theory which the glosses confuse by the mythological turn they give to the simple statements of the Ritual. Not only is it sufficiently clear that the Egyptians attributed to the human soul a divine origin, that they held that it was throughout life engaged in the warfare of good and evil, and that after life its final state was determined by judgment according to its doings on earth. Those who were justified before Osiris passed into perpetual happiness, those who were condemned into perpetual misery. The justified took the name of Osiris, the judge, under which they indeed already appeared for judgment.

It had this plan outline been left unfilled by the priests, the Egyptians might have been credited with a lofty philosophy. Unfortunately, however, a thousand superstitions took the place of the attempt to lead an honest life. In the tombs we find every one who could pay for a sculptured record characterized as justified, every mummy already an Osiris. How was this determined? Possibly there was a council held, which decided that the deceased could be treated as one who was certain of future happiness. It is, however, more probable that the learning certain prayers and incantations, the performance of ceremonies, and the whole process of embalming, together with the charms attached to the mummy, and prayers said by those who venerated the tomb, were held to secure future happiness. In reading the Ritual we are struck by the small space given to man's duties as compared with that filled by incantations and charms. The human mind must have lost sight of the value of good and seized upon the multifarious equivalents which needed nothing to be done by way of either self-restraint from evil or active benevolence. Thus as we look at the documents we see a noble idea lost in a crowd of superstitious fancies, as we look at the Egyptians as they lived, we trace the effect of the undomesticable good, and yet find it always greatly alloyed with evil. The Egyptian idea of the future state is the converse of that of Socrates. It is no little incident of human weakness, like the request to sacrifice a cock to Asculapius, which seems but does not destroy a harmonious whole, a mere glimpse of truth is seen through thick mists peopled with the phantoms of the basest superstition.

In the long course of ages the Egyptian ideas as to the future state seem to have undergone changes, not in themselves, but in the manner in which they were regarded. The vast labour expended on the Pyramids, and their solid simplicity, are in striking contrast with the elaborate religious representations of the tombs of the kings of Dynasties XIX. and XX. So, too, the sculptures on the walls of the tombs of subjects of the earlier kings, representing the everyday life of duty and pleasure, give place to funeral and religious scenes in the later periods. Those were fashions, but they show the changed mood of the national mind. It is only in a tablet of the age of the Poiremes that Greek ideas assert their predominance in a touching lament addressed from the land of shades, which no longer speaks of active happiness, but in its place of purposeless oblivion (Birch, "Two Tablets of the Poireme Period," Archéologiques, xxxix. 22, 23). Laws and Government.—We are gradually gaining an insight into the Egyptian laws. This is principally due to M. Chabas, the third volume of whose Mélanges Égyptologiques mainly consists of essays, nearly all by himself, on texts relative to the administration of justice under the Pharaohs. His general results confirm the accuracy of what Diodorus Siculus and Plutarch state on the subject. It was to be expected that their evidence would have been good as to matters which could not have been easily misunderstood, and which must in the case of Diodorus have been personally observed. In this matter the two acts of authority may fairly be combined.

The government of Egypt was monarchical. It was determined as early as the rule of Dynasty II., according to Manetho, that women could reign. Accordingly we find instances of queens regnant. Their rule, however, seems to have been disliked, and they are passed over in the lists made under Dynasty XIX., when, it may be observed, the royal family seems to have been affected by Semitic influences. The royal power can scarcely have been despotic, although under certain kings it became so. It is sufficient to compare Assyrian and Babylonian with Egyptian history and documents to perceive the difference. The earliest monuments indicate a powerful local aristocracy holding hereditary functions. Those of
the Empire (Dynasties XVIII.-XX.) scarcely indicate any such class. Even the princes are no longer a royal clan, but the children of the reigning sovereign. The whole system of government rests with the king, who appoints all the functionaries and dismisses them at his pleasure. Hence arose a vast and corrupt bureaucracy; to which the decay of Egypt may have been mainly due. At all times the country was governed by nomarchs and lesser officers.

In the earliest period these were local magnates whose office was at least sometimes hereditary, and whose interest it was to promote the welfare of their districts. Under the Empire governments seem to have been mere places of profit given by favour and held by force and corruption, according to the Turkish method.

The laws were administered by judges appointed by the king. It is certain that commissions for an occasion were thus formed. We do not know that there were judges appointed for life; but it is probable that such was the case, as it must have been the duty of a class to be thoroughly acquainted with the written laws. A legal scribe may, however, have been attached to each commission.

All the particulars of each case, though not necessarily submitted in writing, were recorded, and the decision was written. The process was conducted with great care, and the culprit examined on oath. The punishments probably were not extremely severe. For murder, but not for manslaughter, death was the penalty. Adultery was severely punished, perhaps rather by custom than by law. Theft was rigorously prosecuted. For sacrilegious theft the criminal was punished with death. The laws relating to debts are not yet well known. They appear to have been complicated by a system of loans and pawning, and to have been subject to modifications. Of the tenure of land we know little.

The temple-lands seem to have been held at will, as it must have been the duty of each charioteer, and this was especially the case of those men who knew little but much of its use. There are other indications of the social condition of Egypt under the Empire in the complaints of the lower classes; and even the brigandage to which they were subject on the borders of Syria is at once accounted for.

The women were not secluded, but they lived in the cities. The Egyptian troops seem to have been attached to each family. The women were not secluded, and they may have been entertained by the company, and often at the time of marriage. The women were not secluded, but they lived in the cities. The Egyptian troops seem to have been attached to each family. The women were not secluded, and they may have been entertained by the company, and often at the time of marriage. The women were not secluded, but they lived in the cities. The Egyptian troops seem to have been attached to each family. The women were not secluded, and they may have been entertained by the company, and often at the time of marriage. The women were not secluded, but they lived in the cities.
These two kinds of entertainment are precisely what are customary at the present day in Egypt. Among the amusements of the ancient Egyptians was witnessing the performance of various gymnastic feats. They had several games, one of which probably resembled draughts. Under the old kingdom the chief occupations of the rich seem to have been those of a country life, in its duties, the superintendence of the herds of sheep, of the harem and of horses, and of the shipment of produce, and the examination of fisheries, or again in seeing to the efficient work of the people of the estate who were engaged in any craft, and the pleasures of country life filled up the leisure. In ancient times Egypt had far more cover for wild fowl than now. Thus we see from the subjects of the tombs that the rich Egyptian was, in the habit of going into the marshes in a canoe, generally with some of his children, to spear the hippopotamus, or more frequently to knock down birds with the curved throw stick. In fishing, a cat was sometimes used as a retriever. At other times he fished in his ponds, or shot or croused with hounds various animals of the water-kind. Every rich man in the age of the Empire had a chariot, generally drawn by two horses, which he usually drove himself, standing up in it. The life of the ladies was not unlike that of the men, except that they only joined in the sports as spectators. They seem to have passed their time in household matters, in vastating, and in the simplest country pleasures. Occasionally they rode in heavy cars drawn by oxen. Their manners appear to have been indolent and luxurious. Among the lower orders the lighter work usually fell to the women. Both men and women led hard lives, having scanty clothing and poor food; yet the genial climate, in which the wants of the labourer must always have been few, rendered their condition not so painful as one might suppose.

Language and Literature.—The language of the people was the Egyptian, the latter form of which, after they had become Christians, is called Coptic. Comparative philology has not yet satisfactorily determined its place. There can be no doubt that it is related to the Semitic family, but it has not yet been proved to belong to it. The grammatical structure is distinctly Semitic, and many roots are of the type to the Semitic languages. On the other hand, the Egyptian has essential characteristics which detach it from this family. It is monosyllabic, and its monosyllabism is not from which scholars have endeavoured to deduce Semitic, but rather such as would belong to any degraded condition. The monosyllabism is like that of Sumerian. Dr Brugsch strongly affirms the affinity of the Egyptian to the Indo-Germanic as well as the Semitic languages (Histoire, 2 ed. 6), but the former relation has to be proved. It has been supposed that the monosyllabism of the Egyptian is due to its having in part originated from a Nigrum source (Genesis of the Earth and of Man, 2d ed. 255, seqq.). Certainly this is a characteristic of some Nigrum languages, and the want of any large agreement in the vocabulary would be sufficiently explained by the changes that the languages of savage nations undergo from the absence of a literature. It can therefore scarcely be asserted with Dr Brugsch that the Egyptian has no analogy to the African languages (loc. cit., which, no doubt, he intends those which have no Semitic element. The problem will probably be solved either by a careful study of all the African languages which show traces of Semitic structure side by side with those that are without such traces, or by the discovery of the unknown element in Egyptian in the Akkadian or some other primitive language of Western Asia, which cannot be called Semitic in the recognized sense of the term. During its long history the language underwent little change, until it became Coptic. It had two dialects—those of Upper and Lower Egypt, (Brugsch, ubi dict); and by degrees a vulgar dialect was formed which ultimately became the national language not long before the formation of Coptic. One curious innovation in the Egyptian language was the fashion under the Ramses family of introducing Semitic words into that of Egyptian ones. From the manner in which these words are spelt it is evident that the Egyptians at that time had no idea of a Semitic element in Egyptian, for they always treat them as foreign words and retain the long foreign forms. The chief change in Coptic was the introduction of many Greek words, especially to supply the place of religious terms eliminated from the vocabulary. The inscribed and written character of Egyptian was the hieroglyphic, a very complex system, which expressed ideas by symbols or by phonetic signs, syllabic and alphabetic, or else by a combination of the two methods. From this was formed the hieratic, a running hand, or common written form of the hieroglyphic, principally used for documents written on papyrus. Its oldest records are not equal in age to the Curvin line (hieroglyphic inscriptions), but probably it is not much later in origin. The demotic or cursive writing is merely a form of hieratic used for the vulgar dialect, and employed for legal documents from the time of Dyn. XXVII. downwards. The Coptic is written with the Greek alphabet, with the addition of six new letters and a ligature, these letters being taken from the demotic to express sounds unknown to Greek. For further details see the article Hieroglyphics.

Much ancient Egyptian literature has come down to us, and it must be allowed that from a literary point of view it has disappointed expectation. What it tells us full of interest, but the mode of telling rarely rises to the dignity of style. So unsystematic is this literature that it has not given us the connected history of a single reign, or a really intelligible account of a single campaign. The religious documents are still less orderly than the historical. It is only by the severe work of some of the ablest critics during the last fifty years that from those disjunct materials a consistent whole has been constructed.

The most important religious work is the Funerary Ritual, or Book of the Dead, a collection of prayers of a magical character referring to the future condition of the disembodied soul, which has already been noticed. It has been published by Dr Lepsius (Das Totenbuch der Aegypter) and M. de Rougé (Rituel Funéreaire), and translated by Dr Birch (Bunsen's Egypt's Place, v.); de Rougé, in his most interesting papers in the Revue Archéologique (n s.), has done the utmost that a splendid critical faculty and an unusual mastery of language could achieve to present parts of the work in the most favourable form. Still it must remain a marvel of confusion and poverty of thought. Similar to the Ritual is the Book of the Lower Hemisphere. The other religious works and inscriptions are of a wider range. The temple inscriptions indeed are singularly stilted and wanting in variety; but the papyri contain some hymns which are of a finer style, particularly that to the Nile by Enea, translated by Canon Cook (Records of the Past, 107), and that to Hathor, translated by Dr Lushington (ibid. viii. 129) and Professor Maspero (Histoire Ancienne, 33, seqq.). The moral writings have a higher quality than the religious, if we may judge from their beauty remains. The historical writings fall into two classes according to their official or unofficial character. Those that are official present the worst form of the panegyric style, the others are simple though wanting in method. The letters are of more interest, from their lively portrayal of ancient Egyptian manners. In works of fiction there is a greater depth of
is not without its merits, but it has that want of lofty ideas and of charm which is characteristic of the literature of nations which have written very much and have had no other means of addressing mankind.

Science.—Fresh information is being constantly required as to the knowledge of science possessed by the ancient Egyptians. Their progress in astronomy is evident from their temples, and still more from the addresses they formed for the adjustment of different reckonings of time. Their knowledge of geometry is attested by their architecture, and by a document on the lands of the temple of Adfoo; and the annual inundation must have made careful surveys and records necessary for the preservation of landed property. Very great mechanical skill must have been needed to move the vast blocks used in their buildings, sometimes for very long distances, in part by difficult land-routes, and then to place them in position. Considering the want of iron, and of any but the very simplest mechanical appliances, the achievements of the Egyptian architects are an enigma to modern science (Brugsch, Hist., 2d ed. 52) Chemistry and metallurgy had also made great progress. The hardening of the bronze tools with which they cut granite is a proof of this, and the manner in which Moses destroyed the golden calf is another evidence. Medicine and surgery were much studied, and the Egyptians were in those sciences only inferior to the Greeks.

Arts.—Of the arts architecture claims the first place, sculpture and painting being subservient to it among the Egyptians. Temples were not built to contain statues, but to be to the ideal, but their character does not seem to have been produced had the art been more advanced, in some instances it excels their modern inhabitants have preserved its tradition. It may therefore be mentioned that they are ignorant of harmony, but have fineness of ear and of execution. The musicians often sang or danced while they played. The dances of both men and girls were of various kinds, from what may be called feats of agility to slow movements. The dancers were chiefly girls, whose performances evidently resembled those of their modern successors, and whose clothing was even more transparent or scanty. The Egyptians had a great variety of musical instruments, the number of which shows how much attention was paid to the art. Various kinds of harps are represented, played with the hand, and of lyres, played with or without the plectrum, and also a guitar. There are other stringed instruments, for which it is difficult to find a modern name. The Egyptians had also flutes, single and double pipes, the tambourine of various forms, cymbals, cylindrical maces, drums of different kinds beaten with the hands or sticks, the trumpet, and the sacred sistrum. The military music was that of the trumpet, drum, and cylindrical maces; but almost all the instruments were used in the temple services. It is impossible to form any conjecture as to the character of the music, unless we may suppose that with many of the old instruments the modern inhabitants have preserved its tradition. It may therefore be mentioned that they are ignorant of harmony, but have fineness of ear and of execution. The musicians often sang or danced while they played. The dances of both men and girls were of various kinds, from what may be called feats of agility to slow movements. The dancers were chiefly girls, whose performances evidently resembled those of their modern successors, and whose clothing was even more transparent or scanty. Ceremonies.—We know little of the private festivities of the ancient Egyptians. In particular no representation of a marriage ceremony has yet been discovered on the monuments. The greatest ceremony of each man’s life was the construction of his tomb, and the costly personal event was the funeral, the Egyptians were singularly methodical, delighting in music and the dance, and so given to caricature that even in the representation of a funeral ceremony the artist cannot omit a ludicrous incident. The double origin of the race seems as apparent here as in their physical type and their religion. The generous qualities of the Shemite are being perverted by the inferior impulses of the Nigritan; and again the bright elements of the Nigritan character are strangely darkened by the shadow of the gloomy tendency of the Shemite.

The industrial arts were carried to a high degree of excellence by the ancient Egyptians. In weaving and all the process as connected with the manufacture of linen they have never been surpassed. Their pottery was excellent in quality and suitable to its various purposes, and their glass but slightly inferior to that of the Greeks. In the making of furniture, and instruments of music, vases of deceased, alabaster, and other materials, arms and domestic implements, they showed great taste and skill, and their influence on Greek art through the Phcenicians is undoubtedly, though they did little more than afford suggestions to more skilful artists of Hellas.

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to the bank of the river, or the shore of a sacred lake, which was to be crossed in order to reach the place of burial. A sacred boat carrying the mummy, attended by mourners, was towed by another boat, and followed by others containing mourners, offerings, and all things necessary for the occasion (Amy. Eg., pl. 83-86). On reaching the tomb the sarcoagus was placed in a sepulchral chamber, usually at the bottom of a pit, and offerings for the welfare of the deceased were made in a chapel in the upper part of the tomb. One tomb sufficed for each family, and sometimes for some generations; and in the case of the less wealthy, many were buried in the sepulchral chambers of a single pit, above which was no structure or grotto. It has been already noticed that, according to Diodorus, one eye was judged by a legal tribunal before the right of burial was permitted, and of this there may be a survival in the practice of the modern Egyptians, which prescribes that a witness must answer for the good character of the deceased before his burial (Modern Egyptians, ch. xxvii.). After the burial, offerings were made at stated times each year by the family, and the chief inscription begged the passer-by to say a prayer for the good welfare of the modern Inhabitants.]

[Mr. Lane in 1834 estimated the population of Egypt at less than 2,000,000, and gave the following numbers as nearly those of the several classes of which it is mainly composed, namely:

<table>
<thead>
<tr>
<th>Class</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muslims (fellahin or peasants, and townspeople)</td>
<td>1,750,000</td>
</tr>
<tr>
<td>Christian Egyptians (Copts)</td>
<td>150,000</td>
</tr>
<tr>
<td>Circassians, or Turks</td>
<td>10,000</td>
</tr>
<tr>
<td>Syrians</td>
<td>5,000</td>
</tr>
<tr>
<td>Greeks</td>
<td>5,000</td>
</tr>
<tr>
<td>Armenians</td>
<td>2,000</td>
</tr>
<tr>
<td>Jews</td>
<td>6,000</td>
</tr>
</tbody>
</table>

The second group, exclusive of the Arabs of the desert, numbers about 70,000 (Mod. Eg., Introduction). The last official return (1876) estimates the population of the provinces as follows:

- Egypt Proper (Upper, Middle, and Lower) 5,250,000
- Nubia 1,000,000
- Ethiopia 5,000,000
- Darfour, &c. 5,700,000

Of the present population of Egypt, the Muslims constitute seven-eighths, and nearly four-fifths of that of the metropolis; and to this class, and more particularly to the people of Cairo, the following sketch of personal characteristics and customs will relate, save in some few cases, which will be distinguished from the rest. In describing the personal characteristics of this remarkable people, Mr. Lane, in the first chapter of The Manners and Customs of the Modern Egyptians (which was written just before European influence was felt in the country, and still deservedly ranks as the only book of authority on the subject), says:

"In general the Muslim Egyptians attain the height of about 5 feet 8 inches. Most of the children under 9 or 10 years of age have spare limbs and a distended abdomen; but as they grow up their forms rapidly improve. In mature age most of them are remarkably well-proportioned, the men muscular and robust; the women very beautifully formed, and plump, and neither sex is too fat. I have never seen corpulent persons among them, excepting a few in the metropolis and other towns, rendered so by the fatness of the climate. In Cairo, and throughout the northern provinces, those who have not been much exposed to the sun have a yellowish but very clear complexion, and the women, unusually darker and coarser complexion. The people of Middle Egypt are of a more dark brown colour, and those of the more southern provinces are of a deep brown, or brownish black colour. The heads of the Nubas, where the climate is hottest. In general the countenance of the Muslim Egyptians (I have seen many of them of a fine oval form) is composed of the following features: a finely shaded countenance, though some indicating sadness, and a beautifying expression—eyes more beautiful can hardly be conceived. Their charming effect as much heightened by the concealment of the features from the sun, which is as that of other races is covered by a turban, and is rendered still more striking by a uniform appearance among the females of the higher and middle classes, and very common among those of the lower orders, which is so closely fitted as to hide all the face, and, with the exception of the eye, to shun exposure to the sun, have a most of them are pleasing, and many exceedingly lovely, but soon after they have attained their perfect growth, they rapidly decline."
go usually barefoot. The ladies wear a shirt and drawers, a very full pair of silk trousers, and a close-fitting vest with hanging sleeves and skirts, open down the front and on the sides, and long enough to turn up and fasten into the girdle, which is generally a cashmere shawl; a cloth jacket, richly embroidered with gold and having short sleeves, is commonly worn over the vest. The hair in front is combed down over the forehead and cut across in a straight line; behind it is divided into very many small plaits, which hang down the back, and are lengthened by black silk, a piece of black silk, and are lengthened by black silk, hang down the back, and are lengthened by black silk, hanging round the temples. The women of the lower orders have trousers of printed or dyed cotton, and a close waistcoat. All wear the long and elegant head veil. This is a simple "breath" of muslin, which passes over the head and hangs down behind, one side being drawn forward over the face in the presence of a man. A lady's veil is white muslin, embroidered at the ends, in gold and colours; that of a person of the lower class is simply dyed blue. In going abroad the ladies wear above their inner cape a loose robe of coloured silk without sleeves, and nearly open at the sides, and above it a large enveloping piece of black silk, which is brought over the head, and gathered round the person by the arms and hands on each side. A face veil entirely conceals the features, except the eyes; it is a long and narrow piece of thick white muslin, reaching a little below the knees. The women of the lower orders have the same out-door dress of different materials and colour. Ladies use slippers of yellow morocco, and abroad, inner boots of the same material, above which they wear, in either case, thick shoes, having only toes. The poor wear red shoes, very like those of the men. Among the upper class of the head, sometimes the dressing is rapidly becoming assimilated to that of Europeans in its most preposterous form.

In religion the Muslim Egyptians are Sunnites, professing the creed which is commonly termed "orthodox," and are principally of the persuasion of the Shafis, whose celebrated founder, the imam Eth-Shafis, is buried in the great southern cemetery of Cairo. Many of them are, however, Hanafites, to which persuasion the Turks chiefly belong, and in parts of Lower, and almost universally in Upper, Egypt, Malikites.

The civil administration of justice is conducted in four principal courts of judicature,—that of the Zaki, or chief of the police, where trivial cases are generally disposed of; the Divan el-Khedivi, in the citadel, in which the khdive or his deputy presides, and where judgment is given in cases which either do not require to be referred to the other courts yet to be mentioned, or which do not fall within their province; the Divan el-Mahkemeah, the council of the cadi (kides), or chief judge, who must be a Hanafie, and who was formerly a Turk sent annually from Constantinople, but is now appointed by the khedive, and paid a fixed salary of 4000 napoleons a year; and that of the muftie of the Hanafie, or chief doctor of the law, who decides all cases of difficulty. There are besides five minor mahkemeah, or courts, in Cairo, and one in each of the neighbouring towns of Boolak and Mesr El-Ateekah, from which cases are always referred to the court of the kides; and each country town has a native kides, whose authority is generally sufficient for the villages around it. The Council of the Ulkem, or learned men, consists of the sheykhs, or religious chief, of each of the four orthodox persuasions, the sheyhk of the great mosque called the Ashar, who is of the persuasion of the Shafis, and is sometimes its sheyk, the kides, and the chief (nakeeb) of the Shereeks, or descendants of the Prophet, with several other persons. This body was until lately very powerful, but now has little influence over the khdive. Cairo is divided into quarters (Harah), each of which has its sheyk, who preserves order among the people; and the whole city is partitioned into eight larger divisions, each having a sheyk called Shmdah. Various trades also have their sheikhs or chiefs, to whom reference is made in disputes respecting the craft; and the servants have similar heads who are responsible for their behaviour. The country is divided into governments, as before stated, each presided over by a Turkish officer, having the title of muadeer, and subdivided into districts under the control of native officers, bearing the titles "Mamoor" and "Nazar." A responsible person called Sheykh el-Boled (or "sheyk of the town" or "village") presides over each small town and village, and is a native of the place. It must also be mentioned that the El-Bed, or Upper Egypt, is governed by a pasha, whose residence is at Asyoot. Notwithstanding the consistent, able, and in many respects commendable, code of laws which has been founded on the Koran and the Traditions, the administration of justice is lamentably faulty. As is the custom throughout the East, judgment in Egypt is usually swayed by bribes, and a case is generally hopeless when his adversary is rich. To this rule there have been some notable exceptions, and the memory of a few virtuous judges is cherished by the people; but such instances are very rare. The moral and civil laws observed by the Muslim Egyptians, being those of El-Islam, will be noticed elsewhere. A great abuse formerly existed in Egypt in the system of consular jurisdiction. Natives were compelled to sue a foreigner before the latter's consul, and in nine cases out of ten lost their cause. Similarly it was very difficult for a foreigner of one nation to obtain justice against one of another nation at the latter's consolate. Thus abuses have now been done away. At the instance of Nubar Pasha, and after the deliberations of a European commission, three Courts of First Instance at Alexandria, Cairo, and Ismailia, and a Court of Appeal at Alexandria, were established in 1876, presided over by mixed benches of Europeans and natives, the former being the majority, and employing a new code based on the Code Napoleon, with such additions from Muslim law as were possible. These courts decide all cases between the Government or native subjects and foreigners, and between foreigners of different nationalities; and there can be no doubt that they will exercise a great influence for good on the administration of justice in Egypt. It is to be hoped that in course of time they may supersede the old native system in all causes. At present they do but supersede the consular system.

It is very worthy of notice, that in Cairo, as in some other Muslim cities, any one may obtain gratuitously an elementary education, and he who desires the fullest attainable education may receive that also without the payment of a single fee, by joining a class of students in a collegiate mosque. The elementary instruction which most boys receive consists chiefly of reading, and learning the Koran by heart; day schools, as charitable institutions, abound in Cairo, and every town possesses its school, a training fee to the fikas (or master) is the only expense incurred by the scholars. Girls are seldom taught anything beyond needlework. The children of both sexes, except those of the wealthy, have generally a very dirty and slovenly appearance; and often ignorance is adopted to avert the effects of the "evil eye," of which the Egyptians are in great dread. The children of the upper classes are excessively indulged, while the poor entirely neglect their offspring. The leading doctrines of El-Islam, as well as hatred for all religions but their own, and a great reverence for their parents and the aged, are early inculcated.
This deference towards parents cannot fail to strike every foreigner who visits Egypt, and does not cease with the childhood, but is by no means extinguished on marriage. Circumcision is observed at about the age of five or six years, when the boy is paraded, generally with a bridal procession, on a gaily caparisoned horse, and dressed in women's clothes. Some parents, however, and most of the learned, prefer a quicker and less expensive ceremony (Kornelius, xxviii.).

It is deemed disgraceful for a young man not to marry when he has attained a sufficient age; there are therefore few unmarried men. Girls, in like manner, marry very young, some even at ten years of age, and few remain single beyond the age of sixteen, they are generally very pretty. The bridegroom never sees his future wife before the wedding night, an evil which is somewhat mitigated by the facility of divorce. A dowry is always given, and a marriage ceremony performed by a Fikha (a schoolmaster, or one who recites the Koran), in the presence of two witnesses; the ceremony is very simple, but constitutes a legal marriage. The bride of a virgin is attended with great festivity and rejoicing, a grandee's wedding sometimes continuing eleven days and nights. On the last day, which should be that terminating with the eve of Friday, or of Monday, the bride is taken in procession to the grandee's house, accompanied by her female friends, and a band of musicians, jugglers, wrestlers, &c. As before stated, a boy about to be circumcised joins in such a procession, or, frequently, a succession of such boys. A Muslim is allowed by his religion four wives; but advantage is rarely taken of this licence, and very few attempt to keep two wives in one house; the expense and discomfort which polygamy entails act, therefore, as a restriction to its general adoption. A man may, however, possess any number of concubine slaves, who, though objects of jealousy to the legal wife, are yet tolerated by her in consideration of her superior position, and possessed power over them, a power which she often uses with great tyranny, but certain privileges are possessed by the concubine, especially if she have borne a son to her master. Such slaves are commonly kept only by grandees, the generality of the Muslim Egyptians being content with one wife. A divorce is rendered obligatory by the simple words "Thou art divorced," and a triple divorce is irrevocable under occasional circumstances. The hareem system of appointing separate apartments to the women, and sending them from the gaze of men, is observed in Egypt as in other Muslim countries, but less strictly. Mr Lane (ibid. ch. vi) says—"I believe that in Egypt the women are generally under less restraint than in any other country of the Turkish empire, so that it is not uncommon to see females of the lower orders flitting and jesting with men in public, and men laying their hands upon them very freely. Still it might be imagined that the women of the higher and middle classes feel themselves severely oppressed, and are much discontented with the state of seclusion to which they are subjected; but this is not commonly the case; on the contrary, an Egyptian wife who is attached to her husband is apt to think, if he allow her annual liberty, that he neglects her, and does not sufficiently love her, and to censure those wives who are kept and watched with greater strictness." The females of an Egyptian household never sit in the presence of the master, but attend him at his meals, and are treated in every respect as inferiors. The master, however, forms a remarkable exception to this rule, in rare instances, also, a wife becomes a companion to her husband. On the other hand, if a pair of women's shoes are placed outside the door of the hareem apartments, they are understood to signify that female visitors are within, and a man is sometimes thus excluded from the upper portion of his own house for many days. Ladies of the upper or middle classes lead a life of extreme inactivity, spending their time at the bath, which is the general place of gossip, or in receiving visits, embroidering, and the like, and in absolute dolce far niente. It is therefore no cause for wonder that their tone of morals is generally low. Both sexes are abstemious in their food, though fond of pastry, sweetmeats, and fruit. The principal meals are breakfast, about an hour after sunrise, dinner, or the mid-day meal, at noon, and supper, which is the chief meal of the day, a little after sunset. Coffee is taken at all hours, and is, with a pipe, presented at least once to each guest. Tobacco is the great luxury of the men of all classes in Egypt, who begin and end the day with it, and generally smoke all day with little intermission. Many women, also, especially among the rich, adopt this habit. Men who can afford to keep a horse, mule, or ass, are very seldom seen to walk, and numberless excellent asses are to be hired in Cairo. Ladies always ride asses and sit astride. The poorer classes are of course unable to observe the hareem system, but the women are in general carefully veiled. Some of them keep small shops, and all fetch water, make fuel, and cook for their households. The food of the poor is very meagre, flesh meat is rarely tasted by them, and (besides bread) dates, raw cucumbers, and onions are their common food, with soaked beans, roasted ears of Indian corn, &c.

In their social intercourse the Muslim Egyptians are regular, and observe many forms of salutation and much etiquette, yet they are very affable, entering into conversation with strangers at shops and elsewhere. Their courteous and dignified manners are very striking, and are combined with ease and a fluency of discourse. Of their mental qualifications Mr Lane (ibid. ch. xxi) remarks—"The natural and innate character of the modern Egyptians is altered, in a remarkable degree, by their religion, laws, and government, as well as by the climate and other causes, and to form a just opinion of it is therefore very difficult. We may, however, confidently state that they are endued, in a higher degree than most other people, with some of the more important mental qualities, particularly quickness of apprehension, a ready wit, and a retentive memory. In youth they generally possess these and other intellectual powers, but the causes above alluded to gradually lessen their mental energy." Their principal virtues are pieté and strong religious feeling; a strict observance of the injunctions of Khilalim, and a constantly professed belief of God's presence and overruling providence, combined, however, with religious pride and hypocrisy. Their common discourse is full of asseverations and expressions respecting sacred things, often, however, used with a levity which it is difficult for a person unacquainted with their feelings easily to reconcile with their respect for God. They entertain an excessive reverence for their Prophet; and the Koran is treated with the utmost respect—never, for example, being placed in a low situation—and this is the case with everything esteemed holy. They are faithful, and bear calamities with perfect resignation to the Divine will. Their filial piety and respect for the aged have been before mentioned, and benevolence and charity are conspicuous in their character. Poverty is therefore not accompanied by the distressing circumstances which too frequently attend it in Europe. Humanity to dumb animals is another virtue, and cruelty is openly countenanced in their streets, even to unclean animals; that is, however, unfortunately wearing off in consequence of their intercourse with Franks. Their affability, cheerfulness, and hospitality are remarkable, as well as frugality and temperance in food and drink, scrupulous cleanliness, a love of country, and honesty in the payment of debt. It should
be added, however, that the Egyptians rarely, if ever, exercise their social virtues but towards persons of their own persuasion and country. Their vices are indolence, obstinacy, and licentiousness, especially among the women, cupidity (mitigated by gentry), envy, a disregard for the truth, and a habit of cursing. Murders, and other grave crimes of this nature, are rarely committed, but petty thefts are very common.

"The Arabic spoken by the middle and higher classes in Cairo is generally inferior, in point of grammatical correctness and pronunciation, to the dialects of the Bedawees of Arabia, and of the inhabitants of the towns in their immediate vicinity, but much to be preferred to those of Syrna, and still more to those of the Western Arabs" (Lane, ibid. ch. ix.). The language varies in Upper and Lower Egypt, and is more correct inland than near the Mediterranean.

In the decay of Arab literature, Cairo still holds the chief place as a seat of learning, and its university, the Azhar, is undoubtedly the first of the Eastern world. Its principal professors teach "grammatical infusion and syntax, rhetoric, versification, logic, theology, the exposition of the Kor-an, the Traditions of the Prophet, the complete science of jurisprudence, or rather of religious, moral, civil, and criminal law, which is chiefly founded on the Kor-an and the Traditions, together with arithmetic as far as it is useful in matters of law. Lectures are also given on algebra, and on the calculations of the Muhammadan calendar, the times of prayer, &c." (Lane, ibid.). The students, as already remarked, pay no fees, and the professors receive no salaries. The latter maintain themselves by private teaching, and by copying manuscripts, and the former in the same manner, or by reciting the Kor-an. The students are now said to amount to the number of 11,000. Except the professors of literature, few Egyptians are taught more than to read and write; and of these, still fewer can read and write well. The women, as before mentioned, are very rarely taught even to read.

Science is but little studied, and barbers generally practise medicine and surgery. Mehmet Ali endeavoured to improve this state of things, by sending young men to Europe for the purpose of scientific study, and by establishing various schools, with the same object, in Egypt. His improvements have been continued by the present khedive, Isma'il Pasha, with some success.

In common with other Muslims, those of Egypt have very many superstitions, some of which are peculiar to themselves. Tombs of saints abound, one or more being found in every town and village; and no traveller up the Nile can fail to remark how every prominent mountain has the sepulchre of its patron saint. The great saints of Egypt are the imam Esh-Shafe'i, founder of the persuasion called after him, the seyyid Ahmad El-Bedawee, and the seyyid Ibrahim Ed-Dasookee, both of whom were founders of orders of dervishes. The former of these two is buried at the town of Tanta, in the Delta, and his tomb attracts many thousands of visitors annually to his principal festival; the latter is also much revered, and his festival draws together, in like manner, great crowds to his birthplace, the town of Ed-Dasook. But, besides the graves of her native saints, Egypt boasts of those of several members of the Prophet's family; the tomb of the seyyidah Zeyneb, daughter of 'Alee, that of the seyyidah Sakeeneh, daughter of El-Hoseyn, and that of the seyyidah Nefiseeh, daughter of El-Hosayn; all of which are held in high veneration. The mosque of the Hasseneyn (or that of the "two Hassen") is the most reverenced shrine in the whole country, and is believed by all to contain the head of El-Hoseyn. As connected with the superstitious practices of Egypt, dervishes must be mentioned, of whom there are many orders found in that country, the following being the most celebrated --(1) the Rifa'eeeyeh, and their sects the Iwaneeeyeh and Saadeeyeh; (2) the Kadereeyeh; (3) the Ahmadiyeeyeh, and followers of the seyyid Ahmad El-Bedawee, and their sects the Buyoomeeyeh, Shaaraeeeyeh, Shinnawyeeeyeh, and many others; and (4) the Bara'imeeh, or followers of the seyyid Ibrahim Ed-Dasookee. These are all presided over by a direct descendant of the caliph Mahommed, called the Sheikh El Bekre. The Saadeeyeh are the most famous for charming and eating live serpents, &c., and the Iwaneeeyeh for eating fire, glass, &c. The Egyptians firmly believe in the efficacy of charms, a belief which is associated with that in an omnipresent and overruling Providence. Thus the doors of houses are inscribed with sentences from the Kor-an, or the like, to preserve from the evil eye, or avert the dangers of an unlucky threshold; similar inscriptions may be observed over most shops, while almost every one carries some charm about his person. Among so superstitious a people, with whom, as we have already seen, science is in a very low state, it is not to be wondered that the so-called sciences of magnetism, astrology in the place of astronomy, and alchemy in that of chemistry, are in a comparatively flourishing condition.

Since the time of the Turkish conquest, the arts in Egypt have rapidly fallen into decay; this is partly attributable to the deportation of most of the skilled artificers of Cairo to Constantinople by the sultan Selim, but it is mainly owing to the misrule of the Turkish pashas, who have successively domined over this unfortunate country. Cairo contains the most splendid specimens of Arab architecture of any part of the Arabian empire; but at present new buildings are erected after the Constantinopolitan model, or, what is still worse, the purely European--both styles immeasurably inferior to the Arab, and very ill suited to the requirements of the climate. In like manner, every other kind of nature art is gradually perishing; and it is to be feared that even should the people be relieved from oppression and bad government, their industry will be encouraged rather to adopt imaginary improvements imported from Europe, than to cultivate the beautiful taste of their ancestors. The manufactures of the present inhabitants of Egypt are generally inferior to those of other Eastern nations, their handicrafts are clumsy, and the inevitable results of poverty everywhere evident; nevertheless, the curious shops, the markets of different trades (the shops of each trade being generally congregated in one street or district), the easy merchant sitting before his shop, the musical and quaint street-teams of the picturesque vendors of fruit, sherbet, water, &c., with the ever-changing and many-coloured throng of passengers, all render the streets of Cairo a delightful study for the lover of Arab life, nowhere else to be seen in such perfection, or with so fine a background of magnificent buildings.

Among the luxurious habits of the Egyptians must be classed the inordinate use of tobacco (as before mentioned). They are, however, rarely guilty of the vice of drunkenness, wine being prohibited by the Kor-an. Eaters of opium, and smokers of hemp, called haaseeh, are not uncommon, though they are always of the dregs of the people. The bath is a favourite resort of both sexes and all classes. In Cairo alone are upwards of sixty public baths, and every good house has a private bath. Their amusements are generally not of a violent kind, being rather in keeping with the sedentary habits of the people, and the heat of the climate. They are acquainted with chess, draughts, backgammon, and other games, among which is one peculiar to themselves, called Mankalah, and played with cowries. The game of the gendarmes requires great bodily exertion, and wrestlers, &c., are found in the country, though not in any number. Music is the most favourite recreation.
of the people of Egypt; the songs of the boatmen, the religious chants, and the cries in the streets are all musical. There are male and female musical performers, the former are both instrumental and vocal, the latter (called 'Almeh, pl. 'Awalin) generally vocal. The 'Awalim are, as their name ("learned") implies, generally accomplished women, and should not be confounded with the Ghowase, or dancing-girls. There are many kinds of musical instruments. The music, vocal and instrumental, is generally of little compass, and in the minor key; it is therefore plaintive, and strikes a European ear as somewhat monotonous, though often possessing a simple beauty, and the charm of antiquity, for there is little doubt that favourite airs have been handed down from remote ages. The prophet Mohammad condemned music, and its professors are in consequence lightly esteemed by the generality of Muslims, who nevertheless scruple not to enjoy their performances, and resort to the coffee-shops and to private festivities, where they are almost always to be found.

The Ghowase (sing. Ghowaseh) form a separate class, very similar to the gypsies, and are all brought up to the where it always manufactured, to the festivities, and at private festivities, but not public festivals, and at private festivities, but not public festivities. Their performances are too well known to need a description here, but it should be observed that the religious and learned Egyptians hold them to be improper. They dance in public, at festive and religious festivals, and at private festivities, but not in respectable houses, whether before the men or the ladies. Mehmet Ali banished them to Isna, in Upper Egypt; and the few that remained, occasionally danced in Cairo, called themselves 'Awalin, to avoid punishment. A most objectionable class of male dancers also exists, who imitate the dances of the Ghowaseh, and dress in a kind of nondescript female attire. Not the least curious of the public performances are those of the serpent-charmers, who are generally Afars, or Saades dwarfs. Their power over serpents has been doubted by most European travellers, yet their performances remain unexplained, and apparently they possess means of ascertaining the haunts of these and other reptiles, and of alluring them forth; they, however, always extract the fangs of venomous serpents. Jugglers, rope-dancers, and farce-players must day, the dam which closes the canal of Cairo is cut with much more interest, mostly by women. Following Cross, the Thughlaq, the tenth day, being the anniversary of the excepting on the Cross, the 17th of June, and is called that of the Drop (Loylas-Nuktah), because a miraculous drop is then supposed to fall, and cause the swelling of the river. The real rise commences at Cairo about the summer solstice, or a few days later, and on about the 3d of July a crier in each district of the city begins to go his daily round, announcing, in a quaint chant, the increase of water in the Nilmeter of the island of Er-Rodah. When the river has risen 20 or 21 feet, he proclaims the Wefa en-Neel, " Completion " or " Abundance of the Nile." On the following day, the dam which closes the canal of Cairo is cut with much ceremony, and this is the signal for letting the inundation over the surface of the country. A pillar of earth before the dam is called the "Bride of the Nile," and Arab historians relate that this was substituted, at the Muslim conquest, for a sign from which it was the custom annually to sacrifice, to ensure a plentiful inundation. A large boat, gaily decked out, representing that in which the victim used to be conveyed, is anchored near, and a gun on board is fired every quarter of an hour during the night. Rockets and other fireworks are also set off, but the best, strangely, after daybreak. The governor of Cairo attends the ceremony of cutting the dam, with the kadees and others. The crier continues his daily rounds, with his former chant, excepting on the Coptic New-Year's Day, when the cry of the Wefa is repeated, until the Saleeb, or Discovery of the Cross, the 26th or 27th of September, at which period, the river having attained its greatest height, he concludes his annual employment with another chant, and presents to each house some limes and other fruit, and dry lumps of Nile mud.

1 It may be mentioned here that the period of the hot winds, called the Khamsin, that is, "The Fifteen," is calculated from the day after the Coptic Easter, and terminates on the day of Ascension, and that the Muslims observe the Wednesday preceding this period, called "Job's Wednesday," as well as its first day, when many go into the country from Cairo, "to smell the air." This day is hence called Sheem en-Nesem, or "the smelling of the zephyr." The Ulama observe the same custom on the first three days of the spring quarter.
This brief account of the modern Egyptians would be incomplete without a few words concerning the ritual attendant on death. The corpse is immediately turned towards Mecca, and the females of the household, assisted by hired mourners, commence their peculiar wailing, while fixtures recite portions of the Koran. The funeral takes place on the day of the death, if that happen in the morning; otherwise on the next day. The corpse, having been washed and shrouded, is placed in an open bier, covered with a cashmere shawl, in the case of a man; or in a closed bier, having a post in front, on which are placed female ornaments, in that of a woman or child. The funeral procession is headed by men called "Yemeneyeh," chanting the profession of the faith, followed by male friends of the deceased, and a party of schoolboys, also chanting, generally from a poem descriptive of the latter state. Then follows the bier, borne on the shoulders of friends, who are relieved by the passers-by, such an act being deemed highly meritorious. On the way to the cemetery the corpse is generally, in Cairo, in the case of the northern quarters of the city, carried either to the Hassanyeh, or, if the deceased be one of the "Ulema," to the Azhar; or, in the case of the southern quarters, to the serryedheh Zeynab, or some other revered mosque. Here the funeral service is performed by the imam, or munster of the mosque, and the procession then proceeds to the tomb. In the burials of the poor at the grave; and sometimes a tomb. In the burials of the female relations and friends of the deceased.

The Egyptians, of whom there have always been great numbers in Egypt, appear to be even more degraded there than in other countries. They are held in the utmost abhorrence by the dominant race, and often are treated with much cruelty and oppression. Many are beggars and money-changers, &c. The quarter of the Jews, having been exceedingly filthy, and would give a stranger the notion that they labour under great poverty. But such is not the case; the fear of the Muslims induces them to adopt this outward show of misery, while the interiors of many of their houses are very handsome and luxurious. (S. F. — E. L. P.)

**Chronology and History.**

Before giving a sketch of the history of Egypt it is necessary to speak of Egyptian chronology. The difficulty of this subject has increased with the new information of the monuments. The statements of ancient writers were easily reconciled with half knowledge, but better information shows discrepancies which are in most instances beyond all present hope of solution. It may be said that we know something of the outlines of the technical part of Egyptian chronology; but its historical part is in a great measure conjecture before the times when we can check the Egyptian lists by their synchronisms with Hebrew and Assyrian history.

Dr Brugsch, in the second edition of his *Histoire d'Egypte*, frankly admits the growing difficulty of Egyptian chronology in terms which account for his not having continued his *Pharaonique pour servir à la reconstruction de l'Antiquité*, the opinions of which are modified in the later work. Baron Bunsen completed his *Egypt's Place*, but in the progress of the work made a great change in his theories. Professor Lepsius alone has maintained his views, as stated in the *Chronologie et Konigsbuch*, of which the general correctness has not been disproved, although in any new work it would be necessary greatly to modify the details. The words, already referred to, of Dr Brugsch, which close the introduction to his *History* (2d ed.), may be cited in justification of the differences between the present article and that of the last edition of the *Encyclopaedia.*

In comparing this edition with the previous one, the lector impartiali reconnaît facilement que nous avons remanié complétement le premier travail, et de plus, que nous nous sommes abstenus de fournir des hypothèses auxquelles seulement le temps et des découvertes futures pourront substituer les faits* (p. 3).

The Egyptians divided the civil day into 24 hours, 12 of the natural day and 12 of the night, counted from 1 to 12 during each period. Ordinarily the civil day began during the night, which was indifferently reckoned as belonging to the preceding or following day. Probably the beginning was at midnight. In the astronomical tables of the Tombs of the Kings the civil day probably begins with the night, and the reckoning is from the first hour, or six hours before midnight. The indication is, however, not conclusive, as the tables are of nights only, but one term used makes it highly probable (Brugsch, *Historien*, 106). We also find the so-called heliacal rising of Sotha indicated as marking the beginning of the New Year, but this may merely denote that the phenomena characterized New Year's day of the original Egyptian year, or of the fixed year, not that the civil day began with the 11th hour of night (cf. *1Q*, 99 no. 106; *1Q*, *Handbuch der Chronologie*, 1. 100-102).

The Egyptian month was of thirty days. The months are usually known by Greek names occurring in Greek documents, which were taken from the cultus connected with the months, and are thus the Egyptian sacred names. They are 1. Thoth, 2. Phaophi, 3. Athis, 4. Chebent, 5. Tybi, 6. Mabeh, 7. Pamanothe, 8. Rehmenoth, 9. Pachen, 10. Paynu, 11. Enpy, 12. Memu, after which they received the five Epagomenae. The names were applied to the Vague and Alexandrian years. The ancient Egyptians had a different system of names. With them the month was not divided into six seasons of four months each, of which the months were called 1st, 2nd, 3rd, and 4th. These seasons are called "shu," inundation, "jerri," winter, and "shenua" summer. The second and third
beginning of which had an original connection with the summer solstice, and the duration of which was probably the Egyptian measure of a solar year. This length of year would seem to be true linear years, if we are to accept M. Genisen's theory, that the Egyptians had discovered a method of adjusting their solar calendar with the lunar year by the intercalation of a leap year every 400 years in thirty years (\( \text{SI} \)). That the Egyptians at a later time used to have one of the calendar of last, in which three beginnings are mentioned, which stands at the beginning of the Egyptian year, although in the month commonly used in this phenomenon passed through all the seasons, and further that in the earliest times of Egyptian history this phenomenon occurred about the time of the summer solstice, and the conventional beginning of the year of the Nile, the three phenomena probably marked the beginning of the first season when the calendar was instituted (if \( \text{I} \) on the seasons, Brugsch, *Materiartsv., 54 seq*.).

The common year of the ancient Egyptians is that which has been called the Vague Year, because, on account of its length of 365 days it fell short of a tropical or a solar year, and thus passed through all the seasons. Thus this year was that in which the inscriptions are usually dated before the introduction of the Alexandrian year under Augustus, which appears from the Decree of Canopus (Hieron. I, 18, Greek l. 20, 27). The Egyptians also used a fixed year designed from the solar heliacal rising of Sothis, July 20. It contained 365 days, and was adjusted last by the intercalating of four years. It is uncertain how far back this year was in use (The Calendar of Miceru Hubbo, of the time of Ramses III., begins with the rising of Sothis, or the first heliacal rising, with its festival (Mather. p. 84). Perhaps at the time of this monument the phenomenon fell on the lst Thoth of the vague year, or within the month; or if the 1st Thoth is not used as a conventional notation of New Year's day in a typical form (Rud p. 84, 85). In the Roman period, after the Alexandrian year had come into use, there are inscriptions in the Alexandrian and Sothic calendars, but the common Egyptian notation of the months does not appear to have been usually applied to the Sothic year. An exception is noticed by Ptolemy Philadelphus, and another instance in which the month-name Tyb appears to be used for the Sothic calendar, while an Alexandrian name is employed for the corresponding months of the new year (Hieron. p. 62, 17. See on the whole subject, Brugsch, *Materiartsv.*).

The inconvenience of the vague year in relation to the festivals, on account of their connection with natural phenomena, led Ptolemy III. Epiphanus to reform the calendar by intercalating a day after every fourth year before the year next following (Decree of Canopus, Hieron. I, 22, Greek l. 24-25). Obviously this arrest of the common year was more convenient than the change to a fixed year already in use beginning at a different season. This new style was abandoned and the old resumed, but how soon we do not know.

Under Augustus a fixed year, called the Alexandrian, beginning on the 28-29th August of the Julian year, superseded the vague year. According to Lepsius, the Era of Augustus at Alexandria dated B. C. 30, but the first year of the new calendar, probably, B. C. 26, 27. The first year of the Sothic year began in 308 August of the proleptic year of Augustus. The new recompensation, however, in his opinion could not have been introduced before B. C. 2, and was probably introduced A. D. 153. (See Lepsius, *Ueber die Veranlagungszeit der Assyriener, Griechen, und Römer schen Chronologie*, Berlin Akad., 1859). Although it is quite possible that Augustus adopted a proleptic synchronism of the Egyptian and Roman years for the official Egyptian year, thus dating back his reign, yet it is more probable that there was some special reason for choosing the particular Egyptian year selected, which, moreover, was not the first of the Era of Augustus Brugsch put forward a theory, which is the more remarkable in its being on this question as it was of wholly independent origin.

He has shown reasons for supposing that a year beginning on the 29–30th August was in use in Egypt from the time of Dynasty VI (Hieron. I, 22, 25) that many of his correspondences are of the Roman period, and therefore probably refer to the Alexandrian year, but others cannot be so explained, and it seems probable that the year which under another date occurred the vague year was already in use long before (Mather. p. 17 seq). The Alexandrian superseded the vague year, and has remained in use to our times, namely, the Sothic year as the lunar year of the Arabs, but it has now given way to the Gregorian calendar.

At the time of Dynasty XII the Egyptians used four years. The first was a lunar year, a solar year, a lunar year, and a lunar year with an intercalation (Hist. 2nd ed. 99). The second of these years no doubt was the Sothic, the rendering is undoubted, the first, which is that of Dr Brugsch, is uncertain. If, however, it was so, we should have a difficulty in deciding to exactly which four months each season applied. It may be remarked that, according to the Copts, there are four months on the Egyptian calendar of the rise of the Nile, one day before the summer solstice, to the end of the inundation. If this was the ancient reckoning, and the rendering 'inundation' would correspond to spring and early summer. In support of this hypothesis it may be observed that the so-called heliacal rising of Sothis, whose connection with the calendar of early Egypt is evident from the Calendar of last, in which three beginnings are mentioned, which stands at the beginning of the Egyptian year, although in the month commonly used in this phenomenon passed through all the seasons, and the conventional beginning of the rise of the Nile, the three phenomena probably marked the beginning of the first season when the calendar was instituted (if \( \text{I} \) on the seasons, Brugsch, *Materiartsv., 54 seq*.).

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There are two weak points in all these systems. They rest to a greater or less degree upon numbers of governors or monarchs due to a single authority. The sum of 3555 years, which is the foundation of Professor Lepsius’s system, occurs in but a single passage, and the same is the case with 3496 years adopted by Dr Brugsch for the doubtful period of Dynasties XIII—XVII, it is taken from Manetho’s 511 years of the Shepherd dynasties. How, if both these numbers are corrupt? If they are not their escape is a marvel, considering to what authors and copies we owe them. Again, the sums of most individual dynasties rest on Manetho’s sole authority, and we have no monuments which at present hopeless. It is equally unfortunate that while certain dynasties are represented by monuments from which Manetho’s lists can be verified, others have left little or no records. Thus we have no monuments of Dynasties I.—III. until the close of the last. Then there is an abundance of monuments of Dynasties IV., V., VI. A blank follows without a monument that we can assign to Dynasties VII., VIII., IX., X. Records reappear under Dynasty XI.; of Dynasty XII they are abundant. Under Dynasty XIII they become scanty, and of XIV., XV., XVI., XVII. there are but a few, which may be of XV., XVI., or XVII. We have therefore three blank periods, the age before known monuments, the interval of Dynasties VII.—X., and the time of Dynasties X.—XII. About these three periods, the evidence of the Tware lists nor the monuments throw any light. It can be shown, however, that it is possible to make a cyclical system of the dynasties, which, as already shown, is by no means proved.

In the following sketch of Egyptian history no dates before the Christian Era will be given until the beginning of Dynasty XVIII, when approximate chronology becomes possible. Where, however, we may reasonably conjecture the length of a particular period of history, that will be stated.

The traditional age in Egypt is extremely obscure. History begins with the First Dynasty. The earlier period with Manetho, who is supported by the Turin Papyrus, is mythological, the age of the divine reigns, an idea also traceable in the monuments which treat certain divinities as sovereigns. This age is held to be spoken of on the monuments as that of the Shem-Ha-Berith, the first sons, or successors, of Horus, who, in mythology, aid him in his combats with Seth (Chabas, Ant. Hist., 7, 8; Brugsch, Hist., 2d ed. 23). Manetho completely divests the time of any historical character by making it cyclical. It might be supposed that the Egyptians had some records actually dating from this age, if we could accept M. Chabas’s reading of the Ptolemaic inscription relating to the plan of the temple of Denderah, in which it is stated that the original plan was found in the time of Pepi, of Dynasty VI., in ancient characters on a skin of the time of the Shehu-ur, it appears, however, from the context that this inscription was of the time of Khufu, of Dynasty IV., and consequently the parallel expression is merely used to denote remote antiquity (Dümichen, Bauwurkde der Tempelanlage von Dendera, 15, tav. XVI.; 18, 19, tav. XV.; cf. on the other side, Chabas, Ant. Hist., 2d ed. 7, 8).

Egyptian mythology has not been found to contain any allusion to a deluge, nor to have any connection with the Mosaic narrative in reference to the cosmogony and the early conditions of the human race. Similar terms have been pointed out, but the leading facts are wanting. Thus the Egyptian ideas of their prehistoric age have a strange isolation by the side of those of most other nations of remote civilization, which agree in one or more particulars with the narrative of Genesis. Discoveries may, however, modify this view.

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1 Dr Brugsch accepts this difficulty by adding to the genealogy the reigns of Dynasty XVIII. (Hist., 2d ed. 30) so as to make the average length of reigns greater than that of the second, or some other of these reigns had a shorter average length than generations, he recovers lost time.

2 For an apparent agreement of this date and 375 years with the length of the reigns, see p. 160. The length of reigns is based on the genealogical method of Prof. Lepsius, and as these reigns have a shorter average length than generations, he recovers lost time.

3 It must be remarked that he modifies the numbers of Manetho wherever the figures are corrupt, as he thinks he can do so without the danger of falsifying the text and fails to correct them as they have come down to us. This system is continued with much skill in the Chronologia der Ägypter and Chronologia der ägyptische.
In Egypt stone implements have been recently discovered. Owing, however, to the abundance of historical monuments, the prehistoric remains have scarcely received due attention. We do not yet know whether these implements were used by the Egyptians or by savage tribes who may have made incursions into their territory. We find, however, the use of flint arrow-heads in the historical period from the paintings at Benec-Hassan (Dynasty XII.).

It is impossible to conjecture the duration of the prehistoric ages in Egypt. Mr. Chabas has proposed a space of 4000 years before the First Dynasty as sufficient for the development of the civilization which had already attained maturity in the time of the Fourth Dynasty (Ant. Hist., 9, 10). We are, however, so entirely ignorant of the causes of this civilization, and so unable to decide how far it was native to the soil of Egypt, that it is fair to abstain from any attempt to compute a period of the length of which the historical Egyptians themselves do not appear to have had any idea.

With Menes, in Egyptian Menes, the "stable," the history of Egypt begins. It is true that Manetho states cautiously of his successors of the Second Dynasty certain things which are evidently legendary. This must be the natural result of a want of monumental evidence, and a consequent dependence on tradition. At present no monuments are known before the time of the last king of Dynasty III., and thus may be the limit at which inscribed contemporary records began. It is, however, agreed by all Egyptologists that the founder of the Egyptian State is no legendary personage. All we know of him wears the air of history, and is consistent with the conditions in which a state would have been formed. Menes was of Thins, in Upper Egypt, and consequently the first dynasties are called Thinite Thuns, or Thos, in Egyptian Teni, was perhaps only a quarter of the more famous Abydos. Certainly it was occupied by the near neighbourhood of the sacred city. Menes, having gained the sovereignty of Egypt, which probably before his time was divided into two states, founded the city of Memphis. In order to gain sufficient room for the area he changed the course of the Nile by constructing a dike, which turned the stream more to the east. M. Lassus believes that this dike is probably represented by that of Kubaysah. The great temple of Piah, at Memphis, was then founded; and there is no doubt that the seat of government was, under Menes, or not much later, removed to the new city. Menes made laws and waged a successful war. After a long reign of sixty-two years he was killed by a hippopotamus. All this has a perfectly historical aspect. Only a legislator and warrior, and so a mighty hunter, could have set upon a stable basis the long-lasting fabric of Egyptian polity. The main qualities of the man who did this could not have been forgotten at Memphis, which was great and flourishing, the chief seat of Egyptian learning and wealth, before the close of the Third Dynasty. The reproach that Menes corrupted the primitive simplicity of the Egyptians is probably a perverted tradition, like that which changed the tyranny of Khufu and Khafra to impiety. In later times Menes was revered with other kings, but as far as we know had no special worship, a condition suitable to his historical character, now universally admitted.

Athothes, either Tota or Aot, the first or second successor of Menes, is related to have founded the palace at Memphis, and, being a physician, to have written anatomical books. A medical papyrus in the Museum of Berlin, connected with the Ramsee II. (Dynasty XX.), curiously illustrates the second statement. It contains a portion said to have been copied from a very ancient papyrus discovered in the time of Hap-pi, or Usaphados, a later king of the First Dynasty, and has been subsequently taken to Sents, or Setheus, of the next line (Brugsch, Hist., 2 ed., 42). Under Unephesus, the fourth Thinite king, a great famine, the first recorded, ravaged Egypt. He is also said to have raised the pyramids near Kochome. As Kekem is the monumental name of the part of the Memphite necropolis around the Serapeum, and north of the Pyramid of Steps of Sakkarah, Dr. Brugsch and others are disposed to consider that pyramid, which is a very archaic structure among pyramids, to be here intended. The use of the plural "pyramids" by Manetho does not stand in the way of the identification, as we know a case in which a small pyramid was built at the same time as a large one. We do not know the original purpose of the monument. Under the early dynasties it was used as the burial-place of the bulls Apus. As, however, their worship was introduced under Dynasty II., it may have been at this a royal sepulchre, like all other pyramids of which we know the use. Under Senecemps, the seventh king of the dynasty, Manetho speaks of many wonders and a very great plague. Thus the two chief scourges of Egypt appear in this remote age, suggesting a large population, and consequently the length of the period preceding the accession of Menes.

With Boethos, or Butan, the Second Dynasty begins. Manetho relates that in his time a great chasm opened at Boubastis and many perished. Frequent as volcanic shocks are in Egypt, it is long since an earthquake has been experienced in that country. There are, however, reasons, from the manner in which monuments have fallen and the records of earthquakes in Palestine in antiquity, for supposing that Egypt was anciently more subject to such calamities than in later times. The next king, Kaechos, Katak, introduced the worship of the bulls Apus at Memphis, and Mnoves at Helopolis, and of the Mensesian goat, and his name appears to commemorate these innovations, probably a necessary step owing to the increase of population, for animals locally worshipped were thus restricted in number. We also notice that already Helopolis and Mendes, besides Thins, Memphis, and Boubastis had been founded. Und the next king, whose name, Enoerhis, Bunnauiter, was probably commemorative of the new worship at Mendes, we read that a law was passed that women could hold the sovereign power. This might in a semi-barbarous condition be a relic of polyandry, but in Egypt the civilization of Dynasty IV. forbids such an explanation, and we must rather regard this new law as a proof of advancement. In consequence we find a few reigns of queens in the Egyptian lists, but only one of them, Sebek-neferura (Dynasty XII.), appears in those of the monuments. Succession through an heiress was, however, carefully respected, and it was perhaps for want of a son that Enoerhis made this edict. It may be chance, but Manetho calls each king of Dynasty I. after Menes, son of his predecessor, whereas under Dynasty II. he drops this characterization. Nothing more is told of this line but two marvels, that under Manetho's seventh king, Nephrecheres, the Nile was fabled to have flowed mixed with honey for eleven days, and that the eighth, Sesochers, was said to have had a height of 5 cubits and 3 palms, which is not improbably a confused account of a colossal statue. The royal house now changed by the accession of Dynasty III., the first of Memphites. Manetho relates how, under its head, Necerophes or Necerorhia, the Nebka of the monumental lists, the Libyans revolted from the Egyptians but returned to their allegiance terrified by a sudden increase of the moon. It is useless to speculate on the cause of this event which, unless it be legendary, was probably an eclipse; but the glimpse we thus obtain of an Egyptian dominion beyond the Nile valley at this remote age is most valuable. In Genesis the Lehabim, or Lubim, appear as a race kindred to the Egyptians. In the
Egyptian inscriptions they are called Rebu, or Lebu, and appear on early monuments as a dark people. Under the Empire they have Caucasian characteristics. The change was probably due to the great maritime migrations of the Pelasgic tribes, in which the Libyans have an important share. To the next king, Teosorhas, Manetho assigns the invention of building with hewn stones and cultivation of letters, and says that for his services to the Egyptians he called him Aesculapius. If the Pyramid of Steps dates from an earlier king, the first statement must be qualified, though it is to be remarked that the difference of constructive skill between that monument, if so early, and the works of Dynasty IV, would almost justify the hypothesis; and again the discovery of inscriptions of a less accurately ordered kind than those of Dynasty IV, may support the second statement; the third seems at variance with the Memphite worship of the Egyptian Aesculapius, Imb., etc. On the monuments contemporary history begins with the last king the lists assign to this dynasty, Senofem, probably Mausioth’s last but one, Saphurus. We may now take a retrospect of the age. It is in some respects curiously primitive in comparison with that which immediately follows it. Dr Brugsch has remarked the general absence in the kings’ names of the name of Ra, afterwards essential to throne-names, which from the metallic character of these they seem to have been, and the equally general absence of the names of other gods, Ra occurring once in the three dynasties and Sekeri once. Again he has observed the somewhat plebeian aspect of these names, as proper to men who sternly ruled the masses. Men is “the stable,” he who resists; Tota, “he who strikes;” Sena, “the terribleness;” Huni, “he who strikes.” Senofem is “the betterer.” As “the striker of the peoples,” for so he is called in his inscription at Wadede Magharah, in the Nineteenth period, he is a foreign conqueror.

From Senofem, at the close of Dynasty III, to the end of Dynasty VI, we have a succession of contemporary monuments by which History can be reconstructed, not only in its political events, but in those details of the condition of the population which makes an essential part of all real history. Under Senofem we find great material prosperity, and the arts already in that condition of excellence which makes the Pyramid age so popular. The most remarkable in the annals of Egypt. We also find foreign conquests, not as in the time of the Empire for glory, but with the view of extending the Egyptian rule to countries whose products were valuable for the arts. It is thus that this Pharaoh is the first king who has left a tablet in the Nineteenth period, where perhaps he, as Dr Brugsch thinks, was the first to plant military colonies to protect the workers in the mines of copper and the valuable blue stone called “mosfak,” and this idea is supported by his being afterwards worshipped there. He is also the first king whose pyramid is found with its special name on the monuments. Dr Brugsch thinks it is that now called the Pyramid of Meydorn, near which chapels of tombs bearing his name have been discovered, and a group consisting of two statues, remarkable as a splendid specimen of Egyptian archaic art. The subjects, it may be remarked, were usually buried near the pyramid of the reigning king. Senofem the betterer left a good name as a beneficent king, and his worship was maintained until the Ptolemiac period.

Khufu, the Sophei I. of Manetho and Cheops of Hero-


dots, immediately succeeds Senofem in the lists of the monuments, so that he may be regarded as the legitimate head of Dynasty IV. The list of that dynasty is as follows:—Khufu, Ratatf, Khafr, Menkauros, Shepseskaf, corresponding to eight kings in Manetho, in whom also the order is different, Ratatf (Iatosees) following Menkauros (M청소조), a natural consequence of the association in time of the builders of the three most celebrated pyramids, Khufu, Khafr, and Menkauros.

The age of the pyramid-builders is the most brilliant before the Empire. We can judge from the royal tombs of the magnificence of the kings, and from the sculptures around of the wealth of the subjects. The construction of the pyramids has perhaps been unduly marvelled at; we should know in what other manner the kings employed the vast amount of manual labour at their disposal, if we would estimate how much they could have effected by it in pyramid-building in the long period of time for which they ruled. If the two reigns of Khufu and Khafre extended over more than a century and a quarter, we may measure what we know them to have done against the works of other states during a like interval, and the comparison reduces our wonder.

The royal power at this time seems to have been very strong. So at least we may infer from the phraseology of the inscriptions, and from the fact that the kings threw much, if not all, of the force of the nation into personal monuments for their own memorial. Never in later times was the royal tomb the chief object of the king’s reign, or is he so completely detached from the welfare of Egypt. The pyramids with their priesthoods are proofs that then the Pharaoh was more positively worshipped than ever afterwards.

It must, however, be admitted that the great men whose tombs are planned around the pyramids enjoyed abundant wealth and ease. Their time was passed not in war or in state affairs, but in the management of large estates, probably royal gifts, and in superintending the handicrafts of their people, and giving no small share of their leisure to the pleasures of the chase, to hospitality, and to the enjoyment of musical performances. In the chapels of their tombs these occupations of everyday life are portrayed. There is no sign of war, no great military class. It is true that the common folk seem to have been very little in that land of abundance at least represented as happy. On the other hand, it is significant that the nobility include a large number of the royal family, and that the king is

1 The numbers of Manetho are irreconcilable with those of the Tutin Papyrus assigned by scholars to this period. There is evidence that they cannot be considered to be consecutives in the inscription which mentions a lady, a Queen Meretites, as a great favourite of Senofem and Khufu and attached to Khafr. M. de Rouge remarks that she must have been very old at the time of Khafr (See P. Dyn., 244 seq.), but in the list of Manetho the intervening reigns (Iatosees 25, Stephan 11.) amount to 91 years. If we allow her to have been 14 years old at the end of the reign of Senofem and to have lived a year into that of Khafr, her age would not be less than 106 years. This is very near the extreme limit of human life in the Egyptian inscriptions, 110 years, and it is based on the minimum of time possibly required to complete the pyramids. The length of early king’s lives in the Tutin Papyrus supports this view. Probably the reigns overlapped one another. This idea is supported by the two chief chambers in the Great Pyramid, which were roughly made M. de Rouge suspect that it was the tomb of two kings (Iat. 291, note 1). A sound argument for the chronology of the time might be found in the axis of the three chief pyramids. A pyramid was the great work of a king’s reign, and it was so constructed that it might be continually increased in size and yet easily completed at any time. The Great Pyramid would indicate a reign of 23 years; so, too, the Second, whereas the Third would, in its original size, each a shorter time. By this method we should be induced to accept Manetho’s numbers for Khufu, 63 years, and Khafr, 65, but to doubt the long reign of Menkauros, 63. It would be reasonable on the other evidence to make Ratatf contemporary with Khufu or Khafr.
not represented in the tombs, and when he is spoken of it is in terms of the most distant respect. Similarly there is an extraordinary reserve as to worship. Religious subjects are wanting, and the religious inscriptions are usually limited to the formula of dedication. The priesthood is already numerous, but it is connected with the service of the chapels of the pyramids. In the vast court a baneful bureaucratic class is already growing, in future to destroy the welfare of the people.

The reign of Khafra is principally marked by the building of the Great Pyramid. We learn from a curious inscription of a later date that he rebuilt the temple of Isis, near the Sphinx, carried out of the rock by some earlier king, and that he made a pyramid for the Princess Hent-sen in the same neighbourhood. The charge of impiety which the local tradition reported by Herodotus against Khafra thus fails, and the charge of tyranny associated with it, may be equally groundless. The cost of life in building the Great Pyramid can scarcely be compared with that of a long war under conditions resembling those of modern China. It should be noted that Khafra, as well as Khufu and Rastaf, were still objects of worship under Dynasty XXVI. (Brugsch, Hist., 2d ed. 57, 58). The only record of foreign conquest is a tablet in the peninsula of Sinau, commemorating what was probably no more than a successful maintenance of the posts already there established to guard the mines.

The reign of Khafra is commemorated, like that of Khufu, by the royal sepulchre and the tombs of subjects. From the latter we are able to contradict the tradition of his hostility to the national religion, in which Herodotus associates him with Khafra. The most interesting remains of the time are the statues of the king found in a well near the Sphynx, into which they were probably thrown either by a foreign invader or by early Christians or by Arabs, rather than in a popular revolt after his death (cf., however, Maspero, Histoire Ancienne, 73). A statue and a bust of Khafra from this find have been published by M. de Rouge (Sis. Prem. Dyn., pl. iv. v.). Both are remarkable works, showing a naturalistic style that makes them far superior to later statues. The king’s head is evidently a portrait, and the type is more Caucasian than the generality of later subjects.

Menkaure, or Mencheres, the Mycerinus of Herodotus, and the founder of the Third Pyramid, does not seem to have been specially revered in later times, in contradistinction to the report of Herodotus. It is, however, interesting to find connection with the tradition of his support of religion, that the Egyptian Ritual speaks of its 64th chapter as found by Har-hot-es, son of Mencheres, at Hermopolis Magna, where he made an inspection of the temples of Egypt, and brought as a precious document to the king (Brugsch, Hist., 2d ed. p. 59, 60). It would thus appear that the Ritual was not then completed, and Manetho’s statement that Saphis I., Khufu, wrote the sacred book may be another hint as to its date. It may also be noticed that the queen of Khafra was priestess of Thoth (Sis. Prem. Dyn., 277 scq.), and a noble, probably son of Khafra, was high-priest of Thoth at Hermopolis, a dignity held by another prince in the same reign (id. 250, 281).

The most interesting record of Menkaure is his wooden mummy-case, found by General Howard Vyse in the Third Pyramid. In the disappointing silence of those vast monuments, without a single ancient Egyptian writing save the graffiti of workmen and the inscriptions of native visitors, this solitary record of the time is the one authoritative voice from the royal sepulchres, and it tells us in its short archive formula that the whole of Osiris’ name had already matured. The king as Osiris has become divine and has vanquished his enemies (Brugsch, Hist., 2d ed., 58, 59).

The next family, Dynasty V., continued to rule at Memphis. Of its sovereigns we know but little. The last but one, Asa, is the first Pharaoh whom we know to have had two names, the throne-name as well as the ordinary one. To his son Ptah-hotep is assigned the ancient moral treatise already noticed in speaking of Egyptian literature, which is on the whole the best fruit of Egyptian thought that time has spared. The last king, Unas, varied the form of royal tombs, by constructing the great truncated pyramid now called Mastabat-Faraoun, or Pharaoh’s Seat, north of the Pyramids of Dahshoor (id. 67).

The Sixth Dynasty was probably a family of a different part of Egypt. It has left many records which indicate less centralization at Memphis than those of the earlier sovereigns, and mark the beginning of wars for predatory purposes and extension of territory. This change is accompanied by a less careful style of sculpture, and less pains in the excavation of the tombs, as though the Egyptians were gaining a larger horizon, or, it may be, exchanging religion for ambitions. The interest of the dynasty centres in the undoubtedly long reign of Pepa, second or third king of the line, and the inscription of Una. In this inscription we first read of great wars, and foreign conquered nations are spoken of by name. A military system had already begun, for we read how the king sent with Una an officer and soldiers to transport a sarcophagus for the royal tomb from the quarries of Turá. A war is then undertaken against the nomads of the eastern desert— the Amm (Shemtes) and the Herau, “those who are on the sand.” An army is levied from the whole population of Upper and Lower Egypt, as though there were no military caste. Nubians are also enrolled from several countries mentioned by name, which must have been subject to Egypt, and are drilled by Egyptian officers, including priests. Una is appointed general in chief. Five separate expeditions are conducted by him into the country of the Herau. It seems an error to suppose that this nation were Arabs of the desert, for the Egyptian general cut down their vines and their fig-trees (!). Another expedition was conducted by water against the same nation in a country called Takheba (De Rouge) or Tarkhaha (Brugsch), which M. de Rouge conjectures may be Arawa Petraw, a part of Syria, remarking that it was near Egypt, for the expeditions seem to have been annual. The external activity of the reign of Pepa is also attested by a tablet at Wades-Maghárah, and his public works by many inscriptions, among which we must not omit the occurrence of his name at Tanis, and in the inscription relating to the building of the temple of Dendarah. He founded a city called the “City of Pepa” in Middle Egypt, which has wholly disappeared, and tombs of his time are found in various parts of the Nile valley. His pyramid, which, like Memphis, was called the “good station,” Men-aner, was probably at the ancient capital, and may be one of the two great pyramids of Dahshoor, which

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1 This Dynasty appears to have consisted of nine kings, who probably reigned nearly 200 years (Brugsch, Hist., 1 ed. 268).
2 Manetho assigns to Dynasty VI. a duration of 200 years. The monumental lists, themselves in disaccord, the Turau Danys, and the contemporary inscription of Una, show that Manetho’s list is here hopelessly corrupted. Una was in office under the immediate or second successor as well as under the immediate successor of Pepa, usually identified with Phapo, to whom the Egyptian historian assigns a reign of 100 or possibly 94 years. M. de Rouge has seen this difficulty, and discussed without finally resolving it (Sis. Prem. Dyn., 361 sqq.). M. Maspero has proposed a most ingenious restoration of the dynasty, on the idea that Nesperkara is the long-lost Phapo and that his family name must therefore have been Pepa (Hist. Aegypt., 96). This conjecture seems to be confirmed by the name of the later Nesperkara Pepa of the Tablet of Abyd, which is being guarded by the little Osiris as if to distinguish him from an earlier king of otherwise identical name.
are of later date than Dynasty IV., if we may judge from their structure, and both of which from their size imply reigns of the greatest prosperity and of long duration. Pepi was succeeded by his son Merena. The new king made Unas governor of Upper Egypt, and employed him to bring blocks of granite from Elephantine for his pyramid, and in various other works of which the inscription already referred to gives minute details, to obtain wood, which was provided by the prince of four Ethiopian nations already mentioned among those furnishing negroes to the great army of Pepi. We thus learn that tributary Ethiopia was ruled by a native prince or princess under the governor of Upper Egypt, who also had the power of establishing posts in the dependency. Unas made four docks and timber-yards in Ethiopia for building boats, and attached a chapel to each. We may thus expect to find some record of Egyptian rule at this early time, long before the complete reduction of Lower Nubia, in territories far south; for the timber-growing country does not begin for some distance within the tropics.

Merena was followed by his younger brother Neferkara, and, according to Manetho, the dynasty ended with the beautiful Queen Nitocris, whose name appears in the Turm Papyrus, but whose exact historical place is not certain. If she was buried in the Third Pyramid, of which Manetho, according to the copyists, makes her the builder, she enlarged the original work of Mencheres, and certainly no pyramid is so evidently not merely a double structure but one of double design. Nitocris is almost the only Egyptian whose historical character has been lost in a succession of legends. One version of her story is the most ancient form of that of Cinderella; in another, she still bewitched the Arab of the Middle Ages when he approached her pyramid (cf. Maspero, Hist. Anc., 94).

With the later part of Dynasty VI. the second great charm in Egyptian history begins, and we have no monuments to guide us until the close of Dynasty XI. According to Manetho, Dynasties VII. and VIII. were of Memphites, and IX. and X. of Heracleopolites, the Diospolite or Theban line comprising Dynasties XI., XII., and XIII. Whether the dynasties which intervened between the VIIth and XIIth were contemporary or successive, and how much time they occupied, cannot yet be proved. In the Tablet of Abydos, a series of kings unknown from other monuments follows Dynasty VI., and precedes two kings of Dynasty XI. In the Chamber of Kings of El-Karnak other and earlier kings of Dynasty XI. are named, with curious indications that it was first but a local line. To the period of the earlier kings of Dynasty XI. belongs Entef-aa, who reigned at least fifty years. It would appear that the Memphite kingdom waned, and that another line arose at Thebes, the house of the Entefs and Mentuhotepes. The power of these kings gradually increased, and at last one of them reigned under a single rule the whole of Egypt. (Maspero, Hist. Anc., 98, 99.) Probably the Heracleopolite line, Dynasties IX., X., was a local house contemporary with the Memphites or Thebans, or both.

With Dynasty XII., the Theban line was firmly established over all Egypt. In the circumstances referred to in the "Instructions" of Amenemhat I., his first king, to his son Usurtesen I., we have a glimpse into the unquiet condition of the country when the line arose (Id., 101). Similarly the custom of associating the heir apparent as king with his father, the peculiarity of this dynasty, indicates the dangers that then surrounded the throne (cf. Id. 105).

It is to the graces of Benee-Hasan that we owe most of our knowledge of the manners and arts of Egypt under Dynasty XII., and much of this history is told in the most curious fragments of the four tombs of a family of governors under the first five kings of this house. No one can have examined these beautiful tombs without being struck by the advance in architecture which they show, and the evidence of prosperity and cultivation afforded by their paintings. The subjects resemble those of the tombs of the earlier dynasties, but there is a greater variety, partly due to a more luxurious condition of society, partly to a more artistic form. It is sufficiently evident that the preceding dynasty (XI.) cannot have been weak, and the country under its rule distracted A time of prosperity must have preceded this bright period of Egyptian history.

Amenemhat I., probably a successful minister of an earlier king (Brugsch, Hist., 2d ed., 79, 80, 84), had an active and prosperous reign, ruling like Pepi beyond Egypt to the south, and occupying himself in the construction of various monuments. As the head of a new line he paid special attention to the boundaries of territories, to the regulation of the inundation, and to the confirmation of hereditary governors (Benee-Hasan inscr.) Brugsch, Hist., 2d ed., 94, 95.) A very curious view of the state of Egypt in his time is given us by the story of Sanoehe in a hieratic papyrus at the Berlin Museum (translated by M. Goodwin, in Records of the Past, vi. 131, seqq.). It is the history of an Egyptian who fled from the king and took refuge with a neighbouring prince, whose territory unhappily we cannot as yet determine, and after a long sojourn sought his sovereign's pardon and returned home to take into the favour of Amenemhat. The reception of the fugitive abroad, his home-sickness, and the kindness of the Pharaoh, who at the same time is described in terms of the most abject respect, form an interesting picture, and one remarkably illustrating several events in the history of Egypt.

Under Usurtesen I., the co-regent and successor of Amenemhat I., Egypt had reached its highest prosperity after the age of the pyramid-builders of Dynasty IV. The obelisk which still marks the site of Heliopolis, a fragment of a statue at Tanis, inscriptions on the rocks of the Sinaitic peninsula, and a stele from Waded Halfach, recording foreign conquests in the south, now in the Naples Museum, attest the splendour of this reign. The records of private individuals are, however, its most instructive memorials. Mentuhotep has given us a picture of the power and status of an Egyptian prime minister, holding all or nearly all the functions of the members of a modern cabinet, a position singularly parallel to that of Joseph, to the detail that even great men bowed before him. To this stele we owe the information that he gained successes against the Asiatics, the Herusha, and the negroes. (Brugsch, Hist., 2d ed., 91, seqq.)

Of Amenemhat II. and Usurtesen II., the next kings, there is little to relate but that Egypt continued to prosper. It was under Usurtesen III. that a great step in advance was made by the fixing of the boundaries of the Egyptian dominion beyond the Second Cataract, at Semneh and Kummeh, where this king built sanctuaries and fortresses, and placed great boundary-marks in the form of tablets. These in their inscriptions define the limits of the kingdom, and regulate the passage of negroes by the river (Id., 102). Here and throughout Nubia, Usurtesen was worshipped in subsequent times. He had introduced a settled government into the country, which long after was virtually a part of Egypt rather than a dependency. His successor Amenemhat III. is chiefly famous for his great engineering works. That care which the first Amenemhat bestowed on the regulation of the inundation seems to have been the great object of his reign. The rocks of Semneh and Kummeh bear registers of the height of the Nile in several
years of his reign. His great enterprise, the most successful of his kind ever carried out in Egypt, was the construction of a vast artificial reservoir, Lake Moeris, in the province now called the Faiyum, which received the waters of the Nile by a canal, and after the inundation spread them over the country. Its fisheries were also very valuable. Through the neglect of ages the site of Lake Moeris was forgotten until, in our time, M. Linant traced it. Near the lake, Menemhet III. built the famous Labyrinth, of which the remains were discovered by Prof. Lepsius during the Prussian Expedition to Egypt, and there raised a pyramid. The use of the Labyrinth is unknown, the pyramid was no doubt the royal tomb. Its moderate dimensions and the vast size of the lake show a remarkable contrast to the earlier great pyramids, with apparently no corresponding work of public usefulness. At the time which produced the Lake Moeris civilization, the Pyramid Age was long past. A 400 years and better may be supposed to have elapsed. The Pharaohs who bore the name 'Urur Papyrus: who generally bore the names Setek-hotep or Shepnet-sen-fra we know nothing, but that the line from which they are descended is that of Setek-hotep or Nefert-hotep. The longest reign is 10 years, and but one other reaches 10, the total of 13 reigned being 48 years and 23 days, and 5 years of months and 7 of days each. Putting the total at 50 years, the allowance for each reign is under 4 years. This must have been a time of disturbance, but not necessarily of disastrous war, for if we compare the rule of the second line of Memphite sultans we obtain an average reign of 5 years each. Thus we know to have been the consequence of domestic disturbance, and not of great public disasters at home or abroad. Dynasty XIV., of Xosets, the next in Manetho's list, is the first which had certainly its capital in the Delta. Beyond this fact we can only conjecture its importance and chronological place.

The dominion and conquest, at least in part, of Egypt by the Hyksos, or Shepherd Kings, is undoubtedly the chief cause of the obscurity of this age. The event did not happen until at least some time after the beginning of Dynasty XIII., for the eighteenth king of that line in the Turu Papyrus, who bears the significant name Mer-mesha, "the general," has left a record at Tanis near the eastern frontier, which was probably the chief city of at least one dynasty of the invaders.

Manetho, as cited by Josephus, allows for the stay of the foreigners in Egypt a period of 511 years, which has been supposed to be the interval between Dynasty XII. and Dynasty XVIII., by which they were expelled. Thus number, however, rests upon the single evidence of Josephus, and is moreover made up of several periods, which would render its evidence doubtful. A better means of measuring the period would be afforded by the monuments that of a Shepherd king. It may be supposed that this Shepherd king ruled 400 years before Ramesses II. could we place this foreign sovereign. All that can be said as to the chronology is that Dynasty XV. and XVI. were probably of Shepherds, and Dynasty XVII. was certainly of the Shepherds. It is probable that there was a break in the

The date of the Hyksos is thus told by Manetho. Under a king called Piamos, or Paimos (not recognized in the list or on the monuments), certain invaders from the East conquered Egypt without a battle, destroying the temples and slaying or enslaving the people. At length they made one of themselves, Salatus by name, king, who ruled at Memphis, and made all Egypt tributary. For the better protection of the eastern border he rebuilt and fortified the city Avaris, in the Sethroite nome in Lower Egypt, where he kept a great force of soldiers. He was succeeded by other kings mentioned by name, who, and their descendants, held Egypt for 511 years. After this the kings of the Thebans and of the rest of Egypt rose against the Shepherd rule, and a great and long war was waged, until Memnon-muthmosis drove the Shepherds out of all Egypt except Avaris, where his son Tuthmosis besieged them, and failing to take the place agreed to a capitulation, on the condition that they should be allowed to leave the country. Accordingly they went through the desert to Judea and founded Jerusalem. They were called Hyksos, or Shepherd kings, and, according to some, they were Arabs.

This narrative, notwithstanding a general confirmation from the monuments, is evidently not wholly correct. In particular it is inconsistent with all other evidence in attributing the foundation of Jerusalem to the Shepherds, which is evidently the result of an endeavour to connect their departure with the Exodus. Manetho seems to have preserved two Egyptian theories of the Exodus, which both explained that event as the result of external invaders. M. Manetto's researches in the ruins of Tanis have brought to light monuments of the Shepherds, and led to the discovery of others elsewhere, while M. de Rouge and other scholars have explained Egyptian documents connected with the war of independence. From these different sources we learn that the foreigners were of the Shemite or a kindred type, resembling the modern inhabitants of the north-east of Lower Egypt, who still retain the peculiarities otherwise noticed by Greek writers. Though the conquest may have been marked by violence, we find in their own monuments using and cultivating the manners and civilization of Egypt, and even giving a new and characteristic development to their art in their costly monoliths of granite, which show from their material that their rule extended to the southern boundary of Egypt. The war of independence arose between Apepe, one of their later kings, who is described as worshiping Soth only, and one of the three Theban kings called on the monuments Ra-akhen-Taa, at this time apparently a tributary prince. The war, contrary to Manetho's statement, does not seem to have been of long continuance, having been brought to a successful end by Aahmes, first king of Dynasty XVIII. between whom and Ra-akhen-Taa no great length of time can have elapsed. Manetho's text is again erroneous in making the conqueror Tuthmosis (Thothmes IV.), son (grandson) of Memnon-muthmosis (Thothmes III.), such

1 The Tablet of 400 Years states that this period elapsed from some point in the reign of the Shepherd king Set-as-heit Nub to some point in that of Ramesses II., and again Apepe, whose name corresponds to the Apepe, or Apophis of Manetho, almost immediately preceded Dynasty XVIII. Apophis is mentioned among the only Shepherd kings Manetho names. In the passage preserved by Josephus these are called the Shepherd rulers, who were probably the Shepherds, or Shepherd kings. The reference to the Shepherd kings, the XVIII., in the epistle of Apepe, though Enoseus transfers them to Dynasty XVII., perhaps known to Dynasty XVII. In Apepe, Dynasty XVII is of Shepherds and XVIII. of Shepherds and Thebans. If the identification of Apepe with the Apepe of Dynasty XVII. is correct, it would be a further proof of the identity of Apepe with the Shepherd of the Exodus; but this is not proved.
and fifth sovereigns of Dynasty XVIII. In his list; but this may be a confusion due to copies, as there is other evidence that he placed the conquest of the Shepherds under Amon, or Aahmes. The expulsion of the foreigners was not so complete as Manetho would have us imagine.

Several names in their territory remained Shemite, or the population non-Egyptian, and under Dynasty XIX. the prejudice that appears in Dynasty XVIII. seems almost removed.

It must be here noticed that Dr Brugsch has copied a remarkable inscription, from the tomb at Eilethya of Babs, whom he assigns to the latter part of Dynasty XVII., in which mention is made of a famine of successive years. A famine having broken out during many years, I gave corn to the town during each famine. There are but two known instances in history of a famine in Egypt lasting several years, the seven years' famine of Joseph and the seven years' famine of the Fatlmee caliph EI-Mustansir. Dr Brugsch has, therefore, argued with high probability that Babs records the famine of Joseph, and that the old tradition that Joseph governed Egypt under the Shepherd King Apophis is a true one (cf. supra, p. 723, note 1). To this we shall recur in speaking of the Exodus. (See Brugsch, Hist., 2 ed 174, seq.)

The beginning of Dynasty XVIII. (n.c. 1600-1500?) is marked by two great events, the union of divided Egypt under one head, and the victorious end of the great war with the Shepherds. Aahmes, probably a Theban prince, appears to have secured the supreme rule over the various princes of Egypt, without abolishing their rights, and to have gained Egyptian support by his marriage with Nefru-er, daughter of a king of Ethiopias. He then directed his whole power to the final liberation of Egypt. The tomb at Eilethya of Aahmes son of Abuna, an officer of the Egyptian flotillas, in an inscription relating his services, throws light on the events of this war. He passed his early youth in the fortress of Eilethya, one of the strong positions where the kings of Dynasty XVII. rallied their subjects. In the reign of Aahmes he was made officer of the ship called the "Call." Later he went to the flotilla of the north to fight. It was during the siege of the fortress of Avaris. He served in the vessel "Ruling in Memphis," a name no doubt given to commemorate the addition of the ancient capital to the dominions of Aahmes. An engagement took place between the Shepherds and Avaris. Subsequently Avaris was taken, and the young officer carried off three captives, whom the king granted him as slaves. Thus was in the fifth year of Aahmes, in the next we read of the conquest of Sharducas, the Sharuhen of the book of Joshws, in the south-west of Palestine. The narrative then adds that, after having slain the Shepherds of Assa, the king undertook a successful expedition against an Ethiopian country. (See Brugsch, Hist., 1 ed. 80, 81.)

This narrative, while generally confirming Manetho's story, corrects it in some particulars. It states that Avaris was taken, not that it was captured, and indicates a pursuit of the enemy within the territory of Palestine, where they were again conquered in a city which they attempted to hold. The Egyptian expedition was a reassertion of the Egyptian dominion to the south. Two tablets in the Turkish quarries record how, in the twenty-second year of his reign, Aahmes restored the temples which had fallen into decay, the blocks being removed by bulls under the charge of Phoenicians (Fenku) (Brugsch, Hist., 2 ed. 174, 175). It may be recalled that the Phoenicians were noted for their skilled smiths and masons in the time of Solomon, and that as early as the Exodus they were already great metal-workers.

From the time of Aahmes till the close of Dynasty XX. we may reckon the rise, fulness, and decay of the Egyptian Empire. It is a period of abundant monuments, sculptured and painted, and of many papyri, rich in records of the history, manners, and religion of Egypt. The state of the country may be glanced at in this place, where the Shepherd period closes, so as not to break the continuity of the subsequent history.

The sudden growth of prosperity at home and power abroad which marks the early reigns of Dynasty XVIII. is truly surprizing. The Egypt of Dynasty XVIII. is broken up and only slowly resuming; that of Dynasty XVIII. is at once solidly bound together, and soon to engage in designs of world-dominion never hinted at in earlier times. These conditions were the result of a great national war, in which the country discovered her hidden force, and was not content to use it only so far as was needful to make a strong Egypt like that of Dynasty XII. Having conquered her foreign rulers at home, she desired to add their native lands to her own dominions. The first effects of these designs were the enrichment of Egypt. In the early reigns of this house the wealth of the subjects as of the king rapidly grew. From the simple monuments of Dynasty XVII. and the first kings of Dynasty XVIII. there is a sudden advance to richness and splendour. Egypt was, however, becoming a military state. The king is constantly more powerful, and his public works more magnificent; the subjects, notwithstanding the luxury of individuals, have not that solid princely strength that we admire in those of the Pyramid kings and Dynasty XII. The appearance of the horse under this dynasty is most significant. The beasts of burden, the ox and ass, now yield in importance to the war-horse, and the landed proprietor journeys in his car whose ancestor went afoot in hand. Thus the military man succeeds the farmer. The priest is no longer a great man who has assumed sacerdotal functions, but one of a class immensely extended, reaching from the highest dignitaries, one of whom, strengthened by hereditary power, could at last unite the throne down to the mental class who lived upon the superstitious of the people. To carry on the government there grew side by side with soldiers and priests a vast official body, clever, ambitious, and unscrupulous, which rapidly on the true bureaucratic principle involved the administration in an entanglement which must have mainly led to the decline of the Empire. Justice, which was difficult at home, must have been almost impossible abroad. We now cease to hear of hereditary nomarchs studying the welfare of provinces to which they were attached by ancestral connection. All posts went by the royal favour. The common people fared ill in this age. Their function was to supply soldiers for the army and navy, and at first to take there share in the construction of public works; their only hope was to rise in the official class. Handicrafts and all labour were beneath a gentleman; hence no one could rise to his grade but through success at the schools, which were open to every one, and where a boy of talent had his chance of a career (cf. Brugsch, Hist., 1 ed. 16, 17).

Of the administration of provinces and conquered states we know little. Lower Ethiopia had always been ruled as a part of Egypt; this system was extended southward. At first the eastern states only paid tribute. Ultimately garrisons were placed in Palestine and Phoenicia (Brugsch, Hist., 1 ed. 130). Compared with the Assyrians the
Egyptians were civilized conquerors, and the sculptures of their battles do not represent any scenes of extreme cruelty. They do not, however, seem to have known the art of effectually holding their acquisitions, which had to be reconquered over and over again, until the inevitable tide of conquest on the other side set in, and the Empire fell.

On examining the earliest monuments of Dynasty XIX, we are startled by their astounding resemblance to those of Dynasty XI, a resemblance which would, had we no historical evidence on the other side, justify the leap of the Tablet of Abydos from Dynasty XII. to XIX. This may be partly explained as a renaissance of art due to a royal descent traced rather to Dynasty XI than Dynasty XII. Similarly under Dynasty XXVI, there was a reminiscence of the art of the age of the early Memphite Dynasties. We must also not lose sight of the local character of Egyptian art and its intense conservatism, which may have preserved an ancient type through many centuries. The early art of Dynasty XIX. has this character of a survival; that of Dynasty XXVI. is clearly a revival.

The art of this age is in some respects the finest Egypt produced; it is, perhaps, best about the time of Thothmes III. and Amenophis II., the middle of Dynasty XIX. It is inferior in naturalism to the art of Dynasty XIV., and in delicacy to that of Dynasty XXVI., but it has a certain splendour before wanting. After it had attained its highest point it slowly declined, partly from a decay in the vigour of the national character, perhaps more from the vast size of the later monuments, which must have led to a neglect of detail; though this neglect can only be seen by one who is thoroughly acquainted with the Egyptian styles. At all times there is an invincible patience in the mastery of material and the execution of detail. The temples, not the kings' tombs, are now the largest and most costly edifices; though a compromise with the old is effected by making grand temples as sepulchral chapels and religious monuments in their sculptures the events of the reigns. The tombs of subjects do not maintain the proportion of the royal tombs, commemorating in their sculptures the events of the reigns.

It will be well to glance for a moment at the Egyptian geography of this territory. There is great difficulty in explaining it, probably due to the different names apparently given to the same countries and peoples at one and the same time or at different times. We may, however, gain some insight into it by observing that more than one important geographical name can only be an Egyptian equivalent of Semitic names. Thus the Shem, who were wandering Arabs of the desert, who moved up as new into Palestine for pastureage or on predatory excursions, are nothing but "robbers." Most other names may be probably identified with Semitic equivalents: Syria is called Khal; this word is connected with Syria by the late equivalent Aser (cf. Maspero, Hist. Anc., vol. i. p. 161, note 1), which shows that the Egyptians then identified Syria and Assyria. The great nation of Syria in the time of Thothmes III. was the Ruten. These must be the Ruten of Lud, and may be also the Lydians in a primitive state. Under Rameses III. the Kheta, a northern division of the Hittites, held the political position of the Ruten, as though the Ruten had been absorbed. As the Ruten probably represented the Amarnans, so the Hittites represented the Canaanites. The Phoenicians appear to be the Kefa, in the time of Thothmes III. They held an important position in the Mediterranean, probably Cyprus, under Ptolemy III., and may be the Lydians of the 15th century B.C., as the Phoenicians were in the time of Rameses III. Some of the primitive nations whom the Bible mentions as supplanted in the period before Joshua have been represented on the monuments, nor is there any clear notice before the time of Sheshouk I. (Shashak) of the Terahitae. The period of Thothmes II. is one of Amaran supremacy, that of Rameses II. of Canaan; together they well correspond to the age before the Israelite conquest, while the condition of the time of Rameses III. suits the latest age of the Judges. The names of towns present less difficulty. Many are traceable in Biblical geography, and here but one indication occurs which may point to Israelite occupation.

The Egyptian conquests on the east being tributary, there were constant revolts on the accession of new sovereigns. It was thus that Thothmes III., on becoming sole ruler, had immediately to reduce the Ruten and their neighbours. This caused the series of eastern campaigns, which began in the twenty-second year, very early in his sole reign, and certainly extended to the forty-second, during which whole time there was seldom a year of repose. The history of these wars is told in the Annals of Thothmes III., which contrast favourably with those of the Assyrian kings.
If they were marked by barbarity, there is no boast of ought but conquest and the levying of tribute. The tribute no less than a combustible element is added to the great material civilization of the Asiatic states. Throughout, the Ruten are the most formidable enemies; the Kheta only appear. The first great achievement was the defeat before Megiddo of a confederacy led by the prince of Keteob, or Kadesh on the Orontes. In the battle only 85 of the enemys were killed, and 440 taken prisoners; but the magnitude of the success is proved by the capture of 2322 horses, 924 chariots, and the speedy surrender of Megiddo. This town, as in Josiah's time, was the key of the route to the Egyptian frontiers, and on its capture the king and the capital of the Ruten are mentioned as becoming tributaries. In the course of the wars Kadesh was captured twice, and the king of Egypt marched as far as Nineveh, and the name of Babel is mentioned. The reign of Thothmes was also marked by expeditions in Ethiopia, and then we first meet with the supposed Egyptian name of the Daumai, with whom he came in contact during some expedition in the Mediterranean. Great buildings commemorate this active reign, and we have a glimpse of the personal character of the king in the eccentric architecture of one of his additions to the temple of Amen-ra at Thebes. After a reign of 54 years 11 months, reckoning from the accession of Hatchepus, Thothmes III. was succeeded by his son Amenophis II. The accession of the new king was marked by a war in Assyria, in which he captured Nineveh. An incident of his eastern campaigns is remarkable for its Oriental barbarism. He brought back to Egypt the bodies of seven kings whom he had slain with his own hands. The heads of six were placed on the walls of Thebes; the seventh was sent to remote Napata in Ethiopia to hang on the walls to strike terror into the negroes. After a prosperous but probably short reign, Amenophis II. was succeeded by his son Thothmes IV., of whom we only know that he maintained his father's empire during a reign that probably did not exceed the nine years assigned to him by Manetho.

Amenophis III. succeeded his father, and, during a long and it seems mainly pacific reign, occupied himself in great architectural works. Two temples at Thebes owe their origin to him, that on the western bank, which was the funereal temple of his father in the western valley beyond, and of which little now remains but the two great statues in the plain, the Vocal Memnon and its fellow, and also the temple of El-Ukser on the eastern bank. In his time the dimensions of the structures of the earlier kings are surpassed, and the proportions of the most prominent monuments of the Empire are almost attained. Probably he was the first of the family after Aahmes who took a foreigner to wife. On the great scarabaei which commemorate his marriage with Queen Tai, we are informed that his rule extended from Mesopotamia to Southern Ethiopia.

Amenophis IV., the son of this foreign marriage, is the most perplexing character in ancient Egyptian history. Under his mother's influence he introduced a new religion, the worship of Aten, the solar disc, and after a time wholly suppressed the national religion, even changing his name to Khu-n-aten. Abandoning Thebes as the capital, he founded a new city in Middle Egypt, where he constructed a chief temple to Aten, and near which his officials excavated their tombs in the mountain. The type under which the king and his family and subjects are represented is unlike any other in Egyptian art. They are all of emaciated and distended figure, and surpassing ugliness. The king is treated with a servile reserve nowhere else seen on the monuments. His troops are mixed with foreign mercenaries. But we do not hear of foreign expeditions; every one is occupied in the duties of the new religion, without polytheism or idols. Flowers are the chief offerings and adorn the temple throughout; hymns chanted to the sound of harps are the form of worship. Was this a foreign religion, or was the Egyptian restoration of primitive belief! If it were Egyptian why was the sun called Aten, not Ra! The king was the son of a foreigner, and his type and that which marks his court, probably because some were of his mother's race, and art assumed the fashionable type for the rest, is not recognizable in any other characteristic representations of foreign races. It is neither Ethiopian nor Semite nor Libyan. The names of his mother and of her parents, the name of the sun-god, which is Egyptian, and the character of the worship, do not as far as we know point to any of these races. Certainly they are not Semitic. For race and religion we must probably look beyond the horizon of the Egyptian conquests. The type is not without an Indian aspect, and the religion has in its simplicity and the character of its worship a striking likeness to Vedism.

Khu-n-aten had seven daughters and no son. His successor As was his foster-brother and the husband of his eldest daughter. Under him the national religion was tolerated. Two other sons-in-law succeeded. Their line then or soon after came to an end, on the accession of Har-em-heb, or Horus, who claimed to be the legitimate successor of Amenophis III., either by descent or on account of the innovations of Khu-n-aten, who with the kindred of the Empire are never more seen in the monumental lists, in which Har-em-heb is seen as the immediate successor of Amenophis III. The same order is followed in Manetho's list, in which the house of Khu-n-aten follows Horus. What time this line lasted we do not know. Probably it did not exceed a generation. Horus occupied himself in destroying the monuments of Khu-n-aten and his successors, and no doubt is fully restoring the national religion.

Another family gained the throne after the reign of Horus, that of the Ramesides, forming Dynasties XIX. and XX.1 Ramses I., who seems to have been of Lower Egyptian extraction, and not improperly connected by ancestry with the Shepherd kings, seized the royal power, maintained his authority abroad by campaigns in the south and the east, and concluded a treaty of peace with the king of the Hittites. After a very short reign he left the crown to his son Setse I., or Sethos, who strengthened his position by marrying Tai, a granddaughter of Amenophis III. Ramses II., the son of this marriage, thus became the native king, and Setee made him his colleague at a very early age, no doubt to conciliate the Egyptians, a position at first ignored, evidently owing to the difficulty of defining it, but which ended in the virtual abdication of Setee (Maspero, Hist. Anc., 215–217). The troubles that preceded the reign of Ramses I. must have weakened the foreign dominion of Egypt. Wars in the east occupied the earliest years of Setee. The Kheta had now succeeded to the Ruten in the supremacy of Northern Syria. Although Setee conquered the Kheta and captured Kadesh, now their chief town, the war ended by the conclusion of a second treaty between the Egyptian and Hittite kings. It is not necessary to suppose, with M. Maspero (Hist. Anc., 215), that the Egyptian Empire was already waning, because it was thus barred off from Further Asia and obliged to meet the Hittite king on

1 The chronology of Dynasty XIX. presents one great difficulty. We cannot determine the length of the reign of Setes I. Manetho assigns him more than 50 years, which is most improbable, as Ramses reigned 67 years, and his father and mother were married before his father's succession. Ramses dates from his accession to his death 29 years. If we exclude a period of co-regency in the Manethonian numbers for Sethos, the size and beauty of Setee's tomb would imply a reign of not under 30 years. The length of his life cannot have been less than 130 years, and was perhaps as much as 150. It is clear that three generations and the rest of the probably long life of the king (Setee II.) whose birth marked the third, which would give 100+40+50 about 140 years for the total duration.
equal terms. The conditions were no doubt changed from those of the time of Thothmes III., but the list of the
confederacy which the next king of the Kheta led against
Rameses II., compared with that when Thothmes defeated
at Megillo, shows that the Kheta could bring into the field
much more formidable allies than did the Ruten. More-
over there was a change in the foreign policy of Egypt.
Phoenicia and Palestine were ruled by means of a chain of
fortresses held by Egyptian garrisons. (Brugsch, Hist.,
ed 135; Maspero, Hist. Anc., 215.) If the Empire
was narrowed in its limits, it was more solidly ruled; and
this is quite consistent with the conclusion of a treaty with
the Kheta. As a builder Setes I. is only equalled by Rameses
II. He constructed the great hall of columns of El-
Karnak, on the outside of the north wall of which he com-
memorated his victories in a series of most interesting
sculptures. His splendid tomb is in the Valley of the
Tombs of the Kings.

Rameses II. is without doubt the greatest figure in the
long line of the Pharaohs, and at the same time he is one of
the best character we have the best insight in. His reign by
training was in war and in government, for it cannot be a
pure figure of speech by which the tables found near
Dukkeh in Nubia says that when he was but ten years
old no monuments were executed without his orders.
(254, Hist., ed 137). This position was due to his
superior right to the throne. Before the death of Setes I.,
the maritime nations of the Mediterranean made a descent
on Egypt. The Shurdana, or Sardones, and the Turrahs,
or Tyrseni, allied with the Libyans in this enterprise.
Rameses defeated them so effectually that they do not seem
to have again attacked Egypt till the reign of his son
Mempth, about seventy years or more later. The captives of
the Shurdana instead of being employed in public works
were enrolled in the king's guard. After an expedition
against Ethiopia, Rameses, on the death of Setes, returned
to Egypt. Early in his sole reign the peace between the
Egyptians and the Hittites was broken. The king of the
Hittites formed a great confederacy. The nations of Asia
Minor, the Myssans, the Lyceans, the Dardans, the people of
Ilium, are found in the list of the poet of Pentaur, the
Egyptian Rameses, which appropriated records the oldest
war in which Troy had a part. To bring together the army
of the confederates time must have been needed. Probably
the war was determined on by the Hittites on the accession
of the new king. The great campaign was that of the fifth
year of Rames. The decisive battle was preceded by a
request, when the Egyptians were composed of the Arabs
(Shasu), were suddenly, while on the march, attacked
and routed by the enemy, who numbered no less than 2500 war-
chariots. It was only by the personal bravery of Rameses
that the Egyptians escaped destruction. This incident is
the main subject of the poem of Pentaur. But on the next
day the great battle was fought; the confederates were
beaten and retreated into Kadesh. The Hittite king now
sued for peace, which was granted. It was speedily broken.
In his eighth year Rameses took Shalam, probably Saleum or
Jerusalem, Marum (Merom), and Tapur (Dabir near Mount
Tabor), Bothanah, and Chorazim. In his eleventh year he
captured Ascalon. The war does not seem to have been
ended until the Hittite king Khetasas proposed conditions of
peace which he brought to Rames written on a silver
tablet. The treaty concluded on these bases in the twenty-
first year of Rameses is sculptured at El-Karnak. It is a
monuments in document form. Rameses was a true
offensive and defensive, with articles of extradition, remarkable for
his humanity, and others for the protection of commerce
(Maspero, Hist. Anc., 222, 223). Both kings swore to ob-
serve the compact, which was a renewal of the previous
treaties. It is remarkable that in the document the Hittite

prince, instead of being called the "tsi chief of the Kheta," is
now the "greatest king." the style given to Ramses also.
The eldest daughter of the Hittite king was taken in
marriage as queen by Rameses, in whose twenty-third
year Khetasas visited his son-in-law in Egypt. This alliance
does not seem to have been broken for full a century, and
then by conquerors who overcame the resistance of the
Kheta and carried them with them. The remainder of
the reign of Rameses appears to have been undisturbed by great
wars, and given up to those vast buildings which are found
throughout Egypt and Nubia, and which give him the first
place among the architect Pharaohs. About the thirty
year of his reign, his fourth son, the eldest surviving,
was made regent, and on the death of this prince in the fifty-
fifth year, Mempth the thirteenth son, now heir, took this
post, holding it for the rest of his father's reign, which
ended in the sixty-seventh year. Rameses must then have
been at least a hundred years old, perhaps more. He
married three queens, and apparently had by them 23
sons and at least 18 daughters. The whole number of his
children was 179, of whom 111 were sons and 68 daughters.
All are styled princes or princesses, but probably only the
children of queens had the right of succession.

Mempth succeeded Rameses II. There are but few monu-
ments of his reign. The principal event they relate is a
great excursion into the Delta of the maritime nations of
the Mediterranean allied with the Libyans. By this time
the Pelasgic tribes had wrested the dominion of the sea
from the Phoenicians. Some causes, perhaps famines, had
already disposed them to move from Asia Minor and the
Greek islands, seeking new establishments in Egypt. The
thought that Rameses II. defeated in the lifetime of Setes I.,
was now renewed, apparently on a more formidable scale.
The king of the Rebo (Libyans), with the warriors of
several tribes joined the Shurdana (Sardones), the Shaka-
lasha (Gikes), the Leku (Lyceans), the Turrahs (Tyrseni),
and the Akanyuha (Achaeans). They had already entered
Egypt and spread themselves over the west of the Delta,
where they intended to settle, when the Egyptian forces
attacked them and put them to rout after a battle of six
hours' duration. It is remarkable that in this confederacy
the Sh hurdana and A kanyuha are added to the former list,
and the Leku, who were true to the treaty, and during famines were
supplied with corn from Egypt, and the external provinces seem to
have continued quiet. But side by side with the king's
power that of the high priests of Amen-ra had grown to
formidable dimensions, owing probably to the interest Rameses
II., and Mempth showed for Lower Egypt, which put the
weight of Thebes on the side of the highest local functionary.
Mempth was not immediately followed by his son
Setes II. There intervened two reigns, those of Amen-
meses and Siptah, the first of the Rames family by descent,
the second, apparently, by marriage. They appear to have

1 Maspero thinks Ramses II. was at least 50 in the 21st year of
his reign (Hist. Anc., 250). This would make him at least 60
at the time of his death, and 50 at his accession. The latter
age is barely reconcilable with the fact of three of his sons of
the restricted class, which is evidently composed of the children
of successive queens, being engaged in the campaign of the 5th
year. Putting his marriage at 16, we make him at least 5 years
after the birth of these three sons, and cannot suppose the youngest to have
gone to war in his chariot under the age of 14. If so (14+4+14=)
the lowest age for the fifth year, and 28 for the 21st year,
the age of the eldest son, probably 14 at the birth of the
21st year. But it is obvious that probability is against these
extreme limits, and the fact that Ramses outlived twelve of his sons
of the shorter list in favour of a greater age.
been of a branch holding a local principality. Setes II. succeeded them and restored the legitimate line. His reign closed in anarchy. There was no longer one king: the chief of the nomarchs ruled and engaged in civil war. A worse period followed. A Syrian, Arsus by name, became chief of the nomarchs, society was dissolved, and the temple-services neglected. We are as yet unable to say how this revolution began. It seems to have had nothing to do with foreign wars, but to have been brought about by internal weakness. The time it lasted must have been long, according to the Papyrus of Ramesses III., from which alone we know of it. There "many years" are assigned to the period of the nomarchs and "years" to the rule of the Syrian.

As the Exodus is now generally held to have occurred in the later years of Dynasty XIX., its place in Egyptian history may best be here noticed. The view referred to was first carefully worked out by Prof. Lepsius. It rests upon chronological and historical grounds. Manetho, apparently adopting a tradition, placed the Exodus in the reign of Menptah. The number of generations assigned in the Bible to the interval from the Exodus to Solomon would bring the former event to about the same time. The approximate date is in accordance with that of the Rabbinical chronology, B.C. 1314-13. The coincidence is, however, valueless, for the interval from the Exodus to the building of Solomon's Temple, in the Rabbinical chronology, is that of the Hebrew text, 480 years. The date of the Exodus should therefore be about B.C. 1400. The difference between 1480 and 1314-13 is caused by an error in the date of the building of the Second Temple, which is put B.C. 354, only 46 years before the date of Alexander's death, which is dated B.C. 308, or 15 years too late. There is thus a mistake of more than a century in the cardinal date as the building of the Second Temple. If an event of this importance, occurring only 800 years before the drawing up of the chronology, is thus incorrectly dated, and a period of Jewish history obliterated, surely the date of the Exodus cannot rest upon any accurate information. The historical grounds are far stronger than the chronological. Manetho, relating, if we may trust Josephus, a current tradition that Ramesses, a current tradition, of the same name as himself, Amenophis the son of Papis, to cleanse Egypt of all lepers and other unclean persons, whom, accordingly, he set to work in the quarries. On their petition he gave them the city Avaris, left in ruins by the Shepherds. Having occupied the city, they chose one of themselves, a priest of Heliopolis, by name Osiris, as their ruler, who changed his name to Moses. He made laws particularly directed against the Egyptian religion, and sent messengers to Jerusalem to the Shepherds, who had been expelled by the Egyptians, asking their aid and promising to give them their old territory Avaris, and to assist them to subdue Egypt. Accordingly the Shepherds invaded Egypt, when Amenophis came against them, but for superstitious reasons did not fight them, and withdrew to the friendly king of Ethiopia, in whose country he remained thirteen years, his ally protecting the southern Egyptian border. Meanwhile the people of Jerusalem and the unclean Egyptians ravaged Egypt, and destroyed everything connected with the national religion. Afterwards Amenophis and his son Sethos, also called Ramesses, returned, and expelled the Shepherds and the unclean people. Chezmon gives a similar account with the same name for the king. Lycaon only calls him the king of Ethiopia.

The Egyptian evidence for the date of the Exodus would place it about this time. The geographical inquiries of Lepsius have been carried on by Brugsch, who, in a paper read before the Oriental Congress, has identified the principal geographical names of the narrative of the oppression and of the Exodus (Brugsch, Papyrus of Ramses, etc.). Ramses is shown to have been another name of Tanis. The occurrence of this name in Genesis and Exodus is most important as bearing on the date of the Exodus, for it is almost certain that it was given by Ramses II., who rebuilt the great temple of the town. Another cardinal piece of evidence is the mention of the 'Aperis, or'Apuris, as engaged in public works under Ramses II. and later kings, but not after Dynasty XIX. In this name that of the Hebrews has been recognized. If the identification were certain we should have much reason for dating the oppression under Ramses II., which would accord with the Exodus under Menptah.

The difficulties of this theory are not slight. On the chronological side Manetho's date is only dependent on a tradition, and we cannot fix the chronology of the dynasty, B.C. 1300 for Menptah being about the middle point in a doubtful two centuries. The evidence of the Hebrew genealogies therefore is not conclusive for a date identical with that of Menptah, which we cannot yet say is irreconcilable with the chronology founded on the interval of 480 years from the Exodus to the building of Solomon's Temple. If, however, the genealogies are to be taken as a guide for the chronology up to the Exodus, Egyptologists prefer for the period of the sojourn the longer intervals stated in the Hebrew text to the very short ones that would result from the genealogical method. Still greater difficulties arise when we give a critical examination to Manetho's story. It reads like a perverted narrative of the calamities which closed Dynasty XIX., for we cannot suppose two conquests by Asiatists and two expulsions, one by Menptah and Setes II., the other by Sethekh, who subdued the Syrian, nor resort to the violent hypothesis that the Papyrus of Ramesses III. attributes to Sethekh that which Sethes I. achieved. The name of Amenophis is suspicious, the two names of his son Sethos, "who is Ramesses," still more so; the recall of the Shepherds from Jerusalem, and the easy conquest of Egypt without a battle, all read like a legend founded on a fusion of the two periods of Eastern occupation. There is, moreover, another suspicious circumstance in the occurrence of the name of Bocchoris in two versions of the story. This would either point to Bocchoris of Dynasty XXIV., in whose time it is quite possible that there was a large number of Israelite fugitives in Egypt, or to some other king of the same or a similar name: we do not, however, know of any earlier Bocchoris. It may be reasonably asked whether this story has anything to do with the Exodus. Those who hold that it has yet, in common with all Egyptologists, argue, when they examine the Biblical data, on the ground of the minute accuracy of many of these data. If, then, the two narratives, that of Manetho and that of the Papyrus of Ramesses III., relate to the Exodus, they may reasonably be the interpenetration of a Minoan is a faultily and distorted one. It is, however, quite possible that Manetho may have known when the Exodus happened, and yet may have confused it with an event of the same period. The argument from the Biblical data that Ramses II. ruled during the oppression of the Israelites is very strong, though it may be conjectured that a redactor has substituted the later name Ramesses for the earlier Zoan.
The name of the 'Aperu, if certainly that of the Hebrews, would be decisive, but it is not a proper Egyptian equivalent, and names are the transcription of Semitic geographical names into Egyptian, that upon them mainly depends the theory of the sounds of the Egyptian alphabet developed by M. de Rouge and adopted by Dr Brugsch. Here, again, the evidence is inconclusive.

The arguments which would place the Exodus in any other period of Egyptian history are but slight. There is indeed the remarkable occurrence of a name similar to that of Jacob, or identical with it, in a record of the conquests of Thothmes III. This may only be a reminiscence of Jacob, as M. de Rouge suggests, but it would be more natural to take it to indicate that the Exodus was anterior to the time of Thothmes, and there are other names in the list which may possibly point to the same conclusion. Yet the preponderance of evidence is at present greatly in favour of the occurrence of the Exodus towards the close of Dynasty XIX. It is not, however, necessary to accept the date of Prof. Lepsius, in our present state of uncertainty as to the chronology of Dynasty XIX. It is also not a necessary consequence of accepting this historical synchronism, that we should take Manetho's narrative of the Exodus as more than identification with it of an event of the same period. There may seem but unsatisfactory results of the great erudition which has been bestowed on this question. We refrain from speaking more positively when a discovery may at any moment render speculation needless.

If the Exodus took place towards the close of Dynasty XIX., when did the period of oppression and the government of Joseph fall? The reckoning by generations would place Joseph in the later part of Dynasty XVIII., and the oppression under Ramses II. downwards. It is, however, very generally acknowledged that this method of computation is not consistent with the growth of the Israelites from a family to a nation during the sojourn in Egypt. Scholars are therefore disposed to choose a reckoning by years. Here the Biblical data give either 430 years exactly for the sojourn and 400 for the oppression, or else 215 years for the sojourn. The longer periods are those generally preferred. If we reckon by them, the government of Joseph would have fallen under the last Shepherd king, and the oppression would have probably begun under Ashmes, to be greatly increased in intensity under Ramses II.

Somewhat, a chief probably of the line of Ramses II., overthrew the Syrian intruder and again restored the Egyptian monarchy. His short reign, which begins Dynasty XX., was probably entirely occupied in reorganizing the administration of Egypt. Ramses III., whom his father had already made his colleague (Maspero, Hist. Anc., 262), succeeded to a united Egypt but a distracted Empire. Evidently in the time of anarchy every province and tributary state had fallen away. The new king was equal to the effort of repelling invasion at home and reconquering lost territory abroad. In his fifth year he defeated the Libyan tribes who had invaded the west of Lower Egypt.

In his eighth year he met another attack from the opposite quarter. The Tanana ( Данані ) and the Takkaru ( Теурауані ), who now first appear, forming with the Tursha ( Тиршуа ), Wasaba ( Wasoа ), Shashlahu ( Сашало ), Leka ( Леко ), and Pelestea ( Фелстауа), a great confederation, which attacked the east of Egypt by sea and land. Their army conquered and carried with it the Kheta and surrounding tribes. Their fleet, manned by the Takkaru and bharadus, reached Egypt at the same time. The Egyptian army and fleet encountered and defeated them. This campaign, and particularly the sea-fight, form the subjects of interesting reliefs in the great sepulchral temple built by Ramses III. in western Thebes. In his eleventh year a second invasion of the west of Egypt, by the Libyans, aided by the Tursha and the Leka, was equally unsuccessful. The eastern provinces and tributary states were recovered, and an expedition was sent to the Somaliland country on the eastern coast of Africa or Arabia Felix. This last great conqueror finally preserved Egypt from the maritime nations. The course of their migrations seems to have been changed. All that remained of their invasions were the Phalistine settlements in Palestine and one of the Waduba, a Libyan tribe, in the Delta, from whose race the Egyptians drew their names.

We refrain from speaking of the city of Gezer, which he gave to a plotted people, the ‘Ameri, if the numbers are correct, Pseuomeni II., Harpsheche, last king of Dynasty XXI. He seems to have endeavoured to restore the military power of Egypt, for he made an expedition into Canaan and captured the town of Gezer, which he gave to his daughter, Solomon's queen.

During the late period of the Empire, partly through marriages of the Pharos, partly in consequence of the large employment of mercenaries, chiefly Libyans, great settlements of foreigners, Asastic as well as African, were established in Egypt. So far from being deterred, a multitude of Semitic words were introduced into Egyptian, and it even became the fashion to give a Semitic form to native words (Maspero, Hist. Anc., 357, 338). A Shemite family, settled at Bubastis, or in the Bubastite
no doubt seizing had no holds, and obtained the sovereignty of Egypt, leaving the success, had not the yet unconquered princes called in the descendant of the Priest-kings of Thebes, was not to recover his ancient dominions. In one brilliant campaign the country, and would probably have achieved complete pflest-kl~g be of already again set in, and the country commanded. of of Egypt usually the eldest son, and gave high governments to other B.C. XXII. underwent an important change. They made the twentieth year of the Egyptian king's reign, his of Amen-ra an office of a prince of the family, but probably kindred to the Bubastites, Time ThebBlS remarkable sculpture at the temple of El-Karnak in Egyptian history. The Hebrew chronology is indeed small Bedawee tribes. items are far less important, and the Hagarenes recur not like the rolls of the conquerors of the palace. A remarkable sculpture at the temple of El-Karnak in Egypt, which is remarkable for the name Nemrut, or Nimrod, borne by non-kingly members of the family. Probably it came from the further East. Sheshonk L., the Shiakhe of the Bible, may have gained the royal power peaceably. His son Osorkon married the daughter of the last king of the Tanite Dynasty, to whom Sheshonk succeeded. He seems early to have entertained the design of restoring the Egyptian rule in the East, for he received Jeroboam when he fled from Solomon. The revolt of the Ten Tribes enabled him to carry out this project, and late in his reign he marched against Rehabom, and returned with the treasures of the Temple and the palace. A remarkable sculpture at the temple of El-Karnak gives a list of 130 names of towns and peoples conquered by Shishak in this expedition. Long as is the list, it is not like the rolls of the conquerors of the Empire. The items are far less important, and the Hagarenes recur several times, as if to record the subjugation of a series of small Bedawee tribes. Cities of Judah and Israel appear in the list, but the towns in the kingdom of Jeroboam seem to have been Canaanitic, and Canaanites, and it is probable that the Israelite king was not averse to their overthrow. With this occurrence we gain the first good chronological footing in Egyptian history. The Hebrew chronology is indeed not as yet fixed. The Assyrian monuments seem to indicate a reduction of at least twenty-three years in the ordinary dates. The invasion of Shabak is ordinarily dated n.c. 971, but may thus have to be lowered to about n.c. 948; and as it probably took place in about the twentieth year of the Egyptian king's reign, his accession may be dated approximately n.c. 967.

The government of Egypt under the kings of Dynasty XXI. underwent an important change. They made the high-priesthood of Amen-ra an office of a prince of the family, usually the eldest son, and gave high governments to other princes. Thus the power of the Pharaoh ultimately became merely nominal, and Egypt resolved itself into an aggregate of principalities. A further cause of decay was the importance of the Libyan mercenaries which each of the princes commanded. Under a new dynasty, XXIII., said to be of Tanites, but probably kindred to the Bubastites, Egypt was, for a time at least, reunited under a single rule, but towards its close the process of disintegration had already again set in, and the country was divided among nearly twenty princes, at least four of whom took the royal insignia (Maspero, Hist. Anc., 378 seqq.). Among these small princes but one was capable of attempting to reunite Egypt under his rule. This was Tafnekht, Taophachers, prince of Saas, who reduced great part of the country, and would probably have achieved complete success, had not the yet unconquered princes called in the prince-kings of Napata, Panphi Memiamen. While Egypt had declined, Ethiopia had constantly risen, and at this time part of the Thebans owed it allegiance. Panphi, the descendant of the priest-kings of Thebes, was not unwilling to recover his ancient dominions. In one brilliant campaign he defeated Tafnekht and his allies, captured their strong-holds, and obtained the sovereignty of Egypt, leaving the small princes to rule as his vassals. The ancient Empire was thus in part restored, but as it was ruled from Ethiopia, and the little princes constantly strove for independence, it had no real durability. Panphi was succeeded by Kasha, who was probably an Ethiopian, giving his throne to his intermarriage with a princess of the Theban line.

Bokenranf, or Bocchoris, son and successor of Tafnekht, no doubt seize this occasion, was able to carry out the project of his father and make himself king of Egypt. After a short reign marked by energy and prudence he perished in a fresh Ethiopian invasion. Shabak, or Sabakon, conquered Egypt, and having taken Bokenranf in his capital, Saus, put him to a cruel death. It was no longer an Egyptian prince who ruled at Napata; all the circumstances we know of Shabak and his dynasty indicate an Ethiopian prince, governing Egypt as a conquered country, not as their ancient territory. Still Shabak's connection with the priestly line was not forgotten. His sister, Queen Ameniritas, governed Thebes, and the power of the local rulers was limited, not destroyed. Hoshes, king of Israel, sent presents to Shabak,1 who was subsequently drawn into a confederacy of Syrian and other princes against Sargon king of Assyria, but, as in all these wars, the Ethiopian king was a tardy ally. His capital lay too far south, and in crossing the eastern border of Egypt he left the ill-affected princes of the Delta in the line of his communications. He therefore came into the field too late, and it is said in Egypt that Shabak and the Assyrians and experienced a disastrous defeat at Raphia. He lost great part of Egypt, in which the small princes again established themselves, now as vassals of Assyria, Shabak only retaining Ethiopia and part of Upper Egypt.

Shabakot, or Sebutsus, was the son and successor of Shabak. He made himself supreme king in Egypt, but appears to have lost Ethiopia to Tahraka. Towards the close of his reign the Egyptian dynasts joined in an alliance against Sennacherib, who had recently succeeded Sargon. The confederates were defeated, or made their submission one by one. The Egyptian princes lost a battle in southern Palestine, in the territory of their ally Henochiah, who was the last in the East to submit. But the Egyptians again advanced, encouraged by Tahraka, king of Ethiopis, who marched to their support. No battle was fought. The Assyrians moved against the Egyptians, but in one night the invading army perished, and Sennacherib fled to Nineveh. The tradition of the Egyptians agrees with Biblical history in relating the destruction of the Assyrians as miraculous; and it should be noted that for the rest of his reign Sennacherib never ventured again to invade Palestine. During this interval of repose Tahraka entered Egypt, slew Shabatok, and made himself master of the whole country (n.c. 692). After twenty years of what seems to have been a peaceful reign, the Assyrian war began afresh, Esarhaddon, son of Sennacherib, marched to their support. Assyrians moved against the Egyptians, but in one night the invading army perished, and Sennacherib fled to Nineveh. The tradition of the Egyptians agrees with Biblical history in relating the destruction of the Assyrians as miraculous; and it should be noted that for the rest of his reign Sennacherib never ventured again to invade Palestine. During this interval of repose Tahraka entered Egypt, slew Shabatok, and made himself master of the whole country (n.c. 692).

Soon after Esarhaddon's death Tahraka was deposed, and his son Assur-bani-pal, who speedily invaded and reconquered Egypt, driving out Tahraka and restoring the tributary princes. As soon, however, as he had left, a conspiracy broke out, and these chiefs sent emissaries to Tahraka, who were overcome by the Assyrians, and Neku and two others sent in chains to Nineveh, before Tahraka could come to their aid. But he again reconquered Thebes and Memphis. Assur-bani-pal now made a politic use of the Egyptian party, treated Neku with honour, and sent him back to Egypt as ruler of Saus, giving a second principality to his son Pammene. Neku returned to find that Tahraka

1 With this transaction Shabak's record at El-Karnak of the tributes of Syria has been connected (Maspero, Hist. Anc., 390).
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had left Egypt (B c. 666). Urdamen, Tohrak's son-in-law and successor, held Upper Egypt, and at once attacked the Assyrians, captured Memphis from them, and took Neku, whom he put to death, while Psammetik fled into Syria. Aswah-bani against the new king, defeated Urdamen, and sacked Thebes, carrying the whole population captive. The twenty principalities were again set up, but Psammetik was not the chief.

After a time the Egyptian princes became independent of Assyria, but they had once more to submit to an Ethiopian invader, Nount-Mewmen, who reconquered the country without much difficulty, but does not seem to have long held it. The Satte prince Psammetik, whose ambition excited the jealousy of the other dynasts, at last achieved the object for which his predecessors had perniciously fought. By his aid Carian and Ionian mercenaries he put down his rivals, and by a marriage with the niece of Shabak rendered his line legitimate. This alliance with a princess only a generation younger than the first Egyptian king brings into striking relief the partial successes of the Assyrians, captured Memphis from them, and took Neku, but does not seem to have long held it. The Satte prince Psammetik, whose ambition excited the jealousy of the other dynasts, at last achieved the object for which his predecessors had perniciously fought. By his aid Carian and Ionian mercenaries he put down his rivals, and by a marriage with the niece of Shabak rendered his line legitimate. This alliance with a princess only a generation younger than the first Egyptian king brings into striking relief the partial successes of the Assyrians. It was not the first time the Assyrian influence was distinctly felt. Assyria had fallen, and the Babylonian invasion was imminent, but the sea power of Egypt was not yet completely lost. In the reign of Psametik I. the Persian king Croesus was defeated by the Phoenicians, who invaded Egypt, defeated the Persian forces and took Neku. This was not the last of the Persian invasions, for in the reign of Psametik II. the Persian king Cambyses took Neku and set up his brother, Ahasuerus, as king of Egypt. From this time onwards the Persian power extended over the whole of Egypt, and the Persians became the dominant power in the East. The Persian king Cambyses was defeated by the Phoenicians, who invaded Egypt, defeated the Persian forces and took Neku. This was not the last of the Persian invasions, for in the reign of Psametik II. the Persian king Cambyses took Neku and set up his brother, Ahasuerus, as king of Egypt. From this time onwards the Persian power extended over the whole of Egypt, and the Persians became the dominant power in the East.
Phoinicia with every prospect of success but having offended Agesilaus, he was deposed in a military revolt which gave the crown to Nekt-har-neb, or Nectanebo II., the last native king of Egypt. At this moment a revolt broke out. The prince of Mendes almost succeeded in overthrowing the new king. Agesilaus defeated the rival pretender, and left Nekt-har-neb established on the throne. But the opportunity of a decisive blow against Persia was lost. The new king, Artaxerxes III. Ochus, determined to reduce Egypt. A first expedition was defeated by the Greek mercenaries of Nekt-har-neb, but a second, commanded by Ochus himself, subdued Egypt with no further resistance than that of the Greek garrison of Pelusium. Nekt-neb, instead of endeavouring to relieve them, retreated to Memphis and fled thence to Ethiopia, B.C. 3401. Thus miserably fell the monarchy of the Pharaohs after an unexampled duration of nearly 3000 years, or as some think far longer. More than 2000 years have since passed, and though Egypt has from time to time been, except only in few instances, occupied by Asiatics, it was not until the very close of his reign that the Egyptians rose against his rule, and expelled the Persians, choosing as king Khabbash, whose name has been discovered in the Sarapeum. The revolt lasted but three years, and Xerxes I. suppressed it with severity. The Egyptians and their allies were now driven to the island of Prosopitis, and there besieged for eighteen months. At last Inaros was taken and put to death; Amyrtaeus, an Egyptian who reigned with him, fled to the marches, where he long maintained himself. Artaxerxes, after this serious revolt of six years, modified the administration of Egypt, recognizing Thanyura, son of Inaros, and Pausiris, of Amyrtaeus, as vassal kings. The government was, however, held by a Persian satrap; these were merely local princes.

An Amyrtaeus, probably son of Pausiris (Maspero, Hist. Anc., 562), revolted, and on the death of Darius II., B.C. 404, made Egypt virtually independent. He is in the one king of Dynasty XXVIII., Saita, whose successor, Naifaurus I., founded Dynasty XXXIX. B.C. 395. With him the monuments, silent since the rising of Khabbash, again give us information, and under the next dynasty show that the Sait art still lived in spite of the misfortunes the country had undergone. The Mendesians Nai faunaurs and Hakor are chiefly known for the part they took in aiding the enemies of Persia. Hakor was followed by Naifaurus II., and the sovereignty passed to Dynasty XXX. of Mendesians, the last native Egyptian line. The first of these kings, Nekhi-har-heb, or Nectanebo I., came to the throne when a Persian invasion was imminent, B.C. 378. Hakor had already formed a powerful army, largely composed of Greek mercenaries. This army Nekhi-har-heb intrusted to the Athenian Chabrias. The Persians, however, succeeded in causing his recall and in gaining the services of his fellow-countryman Iphicrates. The invading army consisted of 200,000 barbarians under Pharnabazus and 20,000 Greeks under Iphicrates. After the Egyptians had experienced a reverse, Iphicrates counselled an immediate advance on Memphis. His advice was not followed by Pharnabazus; the Egyptian king collected his forces and won a pitched battle near Mendes. Pharnabazus retreated, and Egypt was free.

Nekhi-har-heb was succeeded by Tachos or Teos, whose short reign was occupied by a war with Persia, in which the king of Egypt secured the services of a body of Greek mercenaries under the Spartan king Agesilaus and a fleet under the Athenian general Chabrias. He entered
wealthy, in Egyptian towns, where a Greek was rarely seen, and the king only appeared in the character of a Pharaoh to show respect to the religion of the country. The learned men of both races drew nearer together, and Greek speculation had its effect on Egyptian thought. The local, cultivated settlers were attracted by the native superstitions, and at last the Alexandrian was far more an Egyptian than a Macedonian.

On the division of Alexander's dominions, Egypt fell to the share of Ptolemy, son of Lagus and Arsinoe, a con-cubine of Philip's, whose son he was supposed to have been. Of all Alexander's generals he was the most far-sighted. Instead of amusing at the rule of the empire, he secured the least exposed province and employed its resources rather for defence than offence. One of his first acts was to divert the burial of Alexander from Macedon to Egypt. The body was taken to Memphis, but under Ptolemy's successor it was removed to Alexandria, so that the conqueror reposed in the city he had founded. His first conquest was the Cyrenaica (B.C. 322), a valuable province outside the field of the contests of his rivals, yet greatly useful for naval enterprises against them. Yet he did not declare himself for defence than offence. Cyrenaica (B.C. 322), and at last the Alexandrian was far more an Egyptian Ptolemy than a Greek

Invasion,亚运，and India was made a dependency, and the dominions of Seleucus. He returned to Egypt rich and powerful, and established a desert route from Coptos to Berenice on the coast which he had founded. He made war in Ethiopia, but according to his custom he was content to be on friendly terms with the Ethiopian king Ergamenes. His Egyptian conquests aimed at securing the purpose of securing a supply of elephants for war. An ambassador was sent to India. Thus the trade of Ethiopia, Arabia, and India was secured for Egypt, and continued to enrich it for eighteen centuries. Not less wisely Ptolemy made Alexandria, with the Museum and Library, the heart of the learning of Greece. Many cities were founded by him, or like Ptolemais in Galilee, refounded. In his long reign there was little expenditure but such as was calculated to enrich his empire. At his death his dominions equalled those of his father. He held Cyprus, much of the coast of Asia Minor, the Cyclades, and part of Ethiopia and Arabia. The Cyrenaica was only to be separated for the life of Magas. He twice married. His second wife was Arsinoe II, his full sister, whom he married in accordance with Egyptian rather than Greek notions. She was a woman of great beauty and character, and much loved by her husband. The character of Philopator is marked by the craft rather than the force of his father's, but he inherited to the full his love of literature and his love of pleasure, both undisturbed by warlike ambition. He is the last representative of the old Greek "tyranno's," whom Pandar has made known to us, rather than one of the restless "diadochi."

Ptolemy Euergetes, son of Philadelphia and Arsinoe I, by his accession, B.C. 247, reunited the Cyrenaica to the Egyptian empire. A quarrel between Egypt and Syria immediately broke out. The Syrian king Antiochus II. had married a daughter of Philadelphia. She was now put away, and, as well as Antiochus, murdered by her rival, his first wife Laodice, who set up her son Seleucus II. Ptolemy invaded Syria, which he speedily subdued, and then following the traditions of Egyptian conquest, he passed the Euphrates and reduced the whole of the eastern dominions of Seleucus. He returned to Egypt with vast treasures, including the statues of the gods which Cambyses had carried away, and which he restored to the temples. At sea he was equally fortunate, and the maritime territories of Egypt in the eastern Mediterranean were greatly enlarged. For a moment the old Egyptian Empire was again revived.

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in larger proportions, extending from the Thracian coast to Ethiopia, from Cyrene to the border of India. The eastern provinces speedily returned to the Syrian rule, and Ptolemy was content with a moderate accession of territory on that side. He, however, retained his Greek conquests and pushed far south in Abyssinia. Euergetes was not merely a warlike king. He cared for literature, and more than his predecessors endeavored to please the Egyptians. He is the first Ptolemy whose Egyptian structures are worthy of the wealth of the country. Art had lost its ancient delicacy, yet the sumptuous architecture of this age merits admiration as showing a new though somewhat false development of the ancient style. His reform of the native calendar, as recorded in the Decree of Canopus, is another mark of his wise interest in Egypt. He was fortunate in his marriage with Berenice II, who as queen of Cyrene is the first Egyptian queen who has the same regal style as her husband. Having reigned twenty-five years he left his kingdom to his son.

Ptolemy Philopator, who began to reign B.C. 222, immediately on his accession put his mother Berenice and others of his nearest kindred to death, and, leaving the management of the state to Sosibius, abandoned himself to luxury. Antiochus III., king of Syria, seized the opportunity to drive Ptolemy from all the eastern provinces. Ptolemy at length took the field himself in defence of Egypt, and defeated Antiochus at Raphia, where his success was greatly due to the courage of Arinnae, his sister and wife (B.C. 217). By this victory Cale-Syria and Phœnicia were recovered. Ptolemy returned to his former life, and Arinna was put to death. He left his kingdom, greatly weakened by bad administration and growing disaffection, to a child, Ptolemy Epiphanes. The other two Macedonian kings, Philip V. and Antiochus III., now allied themselves to despoil Egypt of the provinces. Everything but Cyprus and Cyrene was taken, and the Egyptian ministers, as it seems, saved the country by having called in the aid of Rome. The Republic had long been friendly to the Ptolemais, and nothing suited her policy better than a protectorate of Egypt. Accordingly M. Aemilius Lepidus was sent as regent to Alexandria, and Antiochus was commanded to evacuate what he had conquered. It was finally settled that Ptolemy should marry Cleopatra, daughter of the Syrian king, and that she should take Cale-Syria and Phœnicia. From this time Rome ruled Egypt with reference to her own eastern policy. The kingdom of the Ptolemais was not allowed to fall, but it was kept within the most moderate limits. Consequently the weak kings were supported and the strong kings thwarted in every way. Egypt could not rid herself of a bad ruler or enjoy the full advantage of a good one. The rest of the minority of Ptolemy was marked by a serious revolt in Lower Egypt, put down with great difficulty. In B.C. 196, when but thirteen or fourteen years old, the young king was crowned at Memphis, when the decree of the Rosetta Stone was issued. The place of coronation and the terms of the decree show a policy of conciliation towards the Egyptians which the revolt probably rendered especially necessary. The marriage of Ptolemy and Cleopatra I. took place B.C. 193-2, but the dowry was not handed over. Ptolemy continued true to the Romans in their war with Antiochus, but was not allowed to act as their ally, and gained nothing in the subsequent treaty. Another revolt broke out in Lower Egypt, and was cruelly suppressed, B.C. 185. Ptolemy perished by poison in B.C. 181, leaving two sons named Philomotor and Euergetes, who ruled Egypt in succession. Epiphanes inherited the weakness and cruelty of his father, and with him Egypt lost for a time her influence in the affairs of the world.

Cleopatra I., who like Berenice II. was queen as heiress, now became regent for Ptolemy Philometor, and ruled well until her death, about B.C. 174. The ministers then made war on Antiochus IV. (Epiphanes) for the disputed provinces. The Egyptian forces were defeated, Egypt invaded, and Ptolemy seized (B.C. 170). His younger brother, Euergetes II., with an audacious courage that marks his whole career, declared himself king of Alexandria, where he was accepted as such, and beheld his younger brother be sieged in vain, and Roman ambassadors interfered for his protection. Antiochus retired, leaving Philometor as king at Memphis. The two brothers now made terms, agreeing to a joint rule. Antiochus again invaded Egypt, and marched to Alexandria, but was forced to retire by the resolution of a Roman ambassador, M. Popillius L scanus (B.C. 168). From this time Egypt was more than ever in the hands of the Romans, and in consequence of the manner in which Philometor had yielded to Antiochus while Euergetes had resisted his pretensions and depended on their support, we find them constantly aiding Euergetes, whose ability and moderation in justice in treatment of his subjects and by a perfidious and cruel disposition. It was not long before Euergetes succeeded in driving Philometor from Alexandria. The fugitive went to Rome B.C. 164, and the senate agreed to reinstate him. Euergetes was spared by his brother, and the Roman deputies obtained for him the kingdom of Cyrene, where he occupied himself in raising the young king, and attained Egypt, assisted by the active support of Demetrius I. of Syria and the unjust diplomatic aid of the Roman senate. Philometor had the courage to oppose his brother, who invaded Cyprus with Roman ambassadors ordered to settle him in the government of the island. Philometor defeated and took him prisoner, but again spared his life, and left him the kingdom of Cyprus (B.C. 164). The Romans did not interfere with this settlement.

The part Demetrius I. had played in the war in Cyprus led Philometor to take the side of the usurper Alexander I. (Balas), to whom he gave his daughter Cleopatra to wife (B.C. 160). When Demetrius II. endeavoured to recover his father's kingdom Philometor advanced to the support of Alexander, but thinking him treacherous, he turned his arms to the aid of the legitimate king. Rapidly subduing the country, Ptolemy entered Antioch and was hailed king of Syria, to the crown of which he had a claim as descended maternally from the Seleucid line; but he admitted the higher right of Demetrius, whom he aided in repelling an invasion by Alexander. In a decisive victory Ptolemy was thrown by his horse and mortally injured (B.C. 146).

It was in the reign of Philometor that Oianis founded the temple at Onis in Egypt, which tended to increase the importance of the Jewish colonies and to separate the Alexandrian from the Palestinian school.

With this king the power of Egypt finally fell. He was the last Ptolemy who had the capacity to rule amidst the growing difficulties of the time. In his wars he showed courage and generalship, in his dealings with Rome caution and decision, in his rejection of the Seleucid diadem moderation and justice, in his administration of the kingdom and his subjects an extraordinary clemency and humanity.

Cleopatra II., the sister and widow of Philometor, put their son on the throne. Euergetes at once marched from Cyrene to Alexandria. The Romans as usual took the part, and stopped the war on the condition that Euergetes should marry his brother's widow. The young king was instantly put to death. Ptolemy reigned as he had begun: Alexandria was depopulated by his cruelties, though the rest of Egypt seems to have fared better in consequence of his want of ambition. He divorced Cleopatra II. to

1 There is difficulty as to his name. In Egyptian documents Emperor precedes or follows Philometor (Lepova, Bert. Akad. 1852, 454, 1853, 384); but in a Greek inscription in Cyprus the later name is stated (Hogg, J., "Insera. from Cyprus," R. S. Lit., 2 ser., vol. xx at 397, sqq.).
merry his daughter, his niece, Cleopatra III. In B.C. 130
he was driven out of Egypt by a revolt, and Cleopatra II.
became queen. In revenge he put to death their son.
Cleopatra having asked the aid of Demetrius II., Ptolemy
was recalled, B.C. 127, and for the rest of his reign adopted
a more conciliatory policy. He engaged in war against
Demetrius II., and supported the usurper Alexander II.,
against whom he subsequently turned, apparently with
reason. The reconciliation with the Seleucidae led to the
recall of Cleopatra II., with whom Ptolemy now reigned.
He died B.C. 117, in the fifty-fourth year from his first
accession. This king, the worst of the Ptolemies, as
Philometor was the best, is significantly known by the
nickname Physcon, or Fat-paunch, but he was also called
by his subjects the Ill-doer, Kakergetes, instead of the Well-
doer, Energetes. Some of his latest coins present, instead
of the idealized head of Ptolemy, the founder of the line,
bloated and cruel features which can only be those of
Physcon. His one good quality was a hereditary love of
lepers.

Cleopatra III., surnamed Cocos, widow of Energetes and
heiress of Philometor, succeeded, and, in deference to the
popular will of the Alexandrians, associated with her
Ptolemy Soter II., surnamed Lathyrus, or Lathurus, her
elder son, instead of Ptolemy Alexander I., the younger,
whom she preferred. They ruled together with little con-
decord, and at length Cleopatra expelled her colleague, who
had been the real sovereign, and recalled Alexander from
Cyprus, where he had already ruled independently for
seven years (B.C. 107). Cyrene was probably lost to Egypt
about this time. Physcon had left this kingdom to his
base son Ptolemy Aphon, who is generally supposed to
have at once succeeded. The coins, however, show that
the latest Cyrenac coinage of Physcon was continued by
Lathyrus. Cleopatra III. now ruled with a stronger
authority, but by degrees Alexander gained the upper
hand, and ultimately dissensions arose which ended by his
causing her death (B.C. 89): this occasioned troubles which
lost him his throne, and brought about the recall of his
brother (B.C. 89). During the interval Lathyrus had ruled
in Cyprus, and both brothers had engaged on opposite sides
in the wars of the Seleucid princes. As king of Egypt,
Lathyrus died (B.C. 81). He appears to have been weak and
cowardly, with some qualities of a politician and general. He left one legitimate child, a daughter, Berenice III., who succeeded him. Her step-son, Alexander II., son of Alexander I., came from Rome as Sulla's candidate, and married her. The nuptials were almost immediately followed by the murder of the queen by her husband's order, and his deserved death in a popular tumult which was thus excited (B.C. 80).

In default of legitimate issue, two bases sons of Lathyrus now shared the Egyptian dominions, the elder, Ptolemy Neus
Dionysus, surnamed Auletes, the flute-player, taking Egypt,
and his younger brother Ptolemy acquiring Cyprus. Auletes
inherited the vices without the ability of Physcon, and
having spent great sums in obtaining the recognition of the
senate, who probably would not readily part with the claim
based on the legacy which either Alexander I. or II. had
made to the Romans, he wearied the patience of his subjects by heavy taxation, and was expelled by the Alexandrians B.C. 58. His wife Cleopatra V. and daughter Berenice IV. now reigned together, but, on the death of the elder, the younger became sole queen. Berenice was twice married, first to Seleucus, a pretend Seleucid,
whom she put to death, and then to Archelaus. With the
support of Gabinius, proconsul of Syria, Auletes at last
recovered Egypt, B.C. 55. He punished his daughter with
death, and in B.C. 51 his troubled reign came to an end.
At this time his family consisted of two sons and two
daughters,—the famous Cleopatra and Arsinoe, all of
whom in turn exercised regal power, three in a generation.

Ptolemy, the elder son of Auletes, and Cleopatra VI.,
his elder daughter, succeeded in accordance with their
father's will, which the Roman senate ratified. In B.C. 48
he had expelled Cleopatra, who fled into Syria. Advancing to conquer Egypt by force of arms, she was met by
her brother's forces near Fulanium. Here it was that
Pompey, after the ruin of his cause, was assassinated by
order of Ptolemy's ministers as he sought the king's protection.
Cesar, following Pompey, reached Alexandria. Here Cleopatra, giving up her idea of war, made her way to Cesar and secured his interest. After a struggle with
the Egyptian ministers, who almost succeeded in overpowering
Cesar's small forces, and who ultimately had the
support of young Ptolemy, who escaped from the Romans,
the Egyptians were defeated and the king drowned (B.C. 47).
Cleopatra now became queen, associated with her son
Ptolemy, the elder son of Auletes, and Auletes, her
elder son, instead of Ptolemy Alexander I., the younger,
whom she preferred. They ruled together with
a phalangian king, the younger Ptolemy. In B.C. 45 she went to Rome with her brother and young Ptolemy Cesar, her son by the dictator, wishing to be acknowledged Cesar's wife, and
that the boy should reign as his heir. Next year Cesar
was murdered, but by his will his nephew Octavian became
his heir, Cleopatra's son, his only surviving child, being neces-
sarily set aside. The queen determined to secure for her son
Egypt at least, and made away with her unfortunate brother. She next appears when, after the battle of Philippi,
the triumvir Antony made his progress through Asia Minor.
It was necessary that the queen of Egypt should
consult the ruler of the Eastern world. Cleopatra resolved
to govern him. As Cesar seven years before, Antony
now was instantly captivated by the Egyptian queen.
She was past thirty, but if her beauty had waned her wit
had grown. Her portrait on her coins is that of a woman of
intellect and charm, not of beauty. A broad head with
wavy hair, an aquiline nose, large deep-set eyes, and a full
esquint mouth, is supported by a long slender throat.
To these personal qualities she added a mind singularly
cultivated, ready discourse in several languages, and,
what that so often lacks, as ready wit. She took Antony
to Alexandria and governed the East for him. While
her power waxed his waned. Asia Minor was overrun by Q. Labienus at the head of a Parthian army, and
Palestine and Phœnix by another led by Pacorus, the Par-
than king's son. In Italy Antony's adherents were routed.
He now resolved to attack Italy itself, and a great
war was only averted by the armies, which forced the generals to conclude a peace (B.C. 40). Octavia, his rival's
sister, was given in marriage to Antony, and for three
years Cleopatra lost her power. In B.C. 36 Antony deserted
Octavia and returned to Alexandria and the Egyptian
queen. With the exception of an unsuccessful Parthian
campaign and an inglorious Armenian one, Antony effected
nothing. He was amused by the luxurious life of
Alexandria, and, while Cleopatra maintained her Egyptian
rights and ruled with Ptolemy Cesar, she shared Antony's
government of the East, appearing as queen with him as
triumvir upon the coins of Antioch. In B.C. 32 Octavian
declared war against Cleopatra, and Antony took his
revenge by divorcing Octavia. Then followed the conflict
in the Adriatic for the world's empire, in which Antony's
old military skill failed him, and Cleopatra, leaving the
battle, perhaps through a woman's fear, drew him away
also (B.C. 31). Arrested at Alexandria, Cleopatra allowed
more energy than Antony, and, when Octavian reached
Egypt, more policy. Antony, on the false news of the queen's death, stabbed himself, and Cleopatra, finding October, she contrived to make her walk in his triumph, perished by her own hands in some unknown way. Thus Egypt became a Roman province, b.c. 30. The young Ptolemy Caesar, in spite of his double claim, perished by the command of Octavian, but the beautiful Cleopatra, Antony's wife, who obtained the whole of the empire by the cleverly taken by his divorced wife Octavia, brought up with her own children, and married to a kug, Juba II. of Mauretania. With their son Ptolemy, whom Caligula put to death A.D. 40, this great line came to an end. Its genius ended with Cleopatra. The decline of the Romans tended to give the moderns too low an estimate of her abilities. When we see what Egypt was under Augustus and under her we are astonished to perceive how much she accomplished by her management of Caesar and of Antony.

After all the other independent states had been absorbed by Rome, Egypt was raised from a more protected province to be once more a kingdom, and at last Alexandria became again a seat of empire. But the task Cleopatra set herself was beyond accomplishment; the more she turned Antony into an imperial ruler the less could he control the Roman armies by which he governed. Thus the fabric she had raised was rotten at the base, and when her fall it disappeared. The history of Egypt under the Romans being that of a province, and the most interesting events matter of ecclesiastical history, may here be told very briefly. Worn out by the cruelty and avance a series of bad rulers, the country must have wel-

The country, whose school of thought was in some respects ready to welcome it. From them it rapidly passed to the Greeks. Ultimately, the tolerant policy of Christianity came with special fitness to a subject race. The history of the Coptic version has yet to be written. It presents some features of great antiquity, and, unlike all others, has the truly popular character of being written in the three dialects of the language. Side by side then grew up an Alexandrian Church, philosophic, disputative, ambitious, the centre of Christianity, and an Egyptian Church, ascetic, contemplative, mystical. The two at length influenced one another; still we can generally trace the philosophic teachers to a native rising, the mystic to an Egyptian.

Celsus, in revenge for an affront, massacred the population of Alexandria. Under Decius the Christians again suffered from persecution. When a German broke in the weak reign of Gal-

VA.
The success of Heraclius restored Egypt to the Empire and for a time it again received a Greek governor. The Monophysites, who had taken advantage of the Persian occupation, were persecuted and their patriots expelled. The Arab conquest was welcomed by the native Christians, but with it they ceased to be the Egyptian nation. Their language is still used in their churches, but it is no longer spoken, and its literature, which is wholly ecclesiastical, has been long unproductive.

The decline of Egypt was due to the purely military government of the Romans, and their subsequent alliance with the Greek party of Alexandria which never represented the country. Under weak emperors, the rest of Egypt was exposed to the raids of savages, and left to fall into a condition of barbarism. Ecclesiastical disputes tended to alienate both the native population and the Alexandrians. Thus at last the country was merely held by armed force, and the authority of the governor was little recognized beyond Alexandria, except where garrisons were stationed. There was no military spirit in a population unused to arms, nor any disposition to patriotic or arbitrary persecuting rule. Thus the Muslim conquest was easy.

In the year 639 of our Era, or the eighteenth of the Flights, Egypt was invaded by the Muslims, under the celebrated 'Amr Ibn-El-As (or El-Asee). Entering the country from Syria, at the head of only 4000 men, he passed through Egypt and took it after thirty days. His town was considered the key of Egypt on the Syrian frontier, and its capture was, therefore, an important advantage, which opened the country southwards to the Arab general. He marched thence to El-Yens, the ancient Heliopolis, where he found the Greeks collected in force, and compelled by John, the governor of El-Makreezee, or rather John the Mukowkl8, or Qureyy the Mukowkis, the governor of Memphis, a native Egyptian. They offered a vigorous defence, but were put to the rout, and 'Amr advanced to the banks of the Nile and laid siege to Egyptian Babylon, a fortress of great strength, and garrisoned by a Roman legion. Here he received two reinforcements of 4000 Muslims each, and after a protracted siege of seven months he took the place by assault. In an enemy's country, and beyond the frontier, and country from town, was celebrated 'Amr Ibn-EI-As (or EI-Makreezee), the symbol of the governor of Egypt under the Byzantine Empire, as the prayer and deliverance of the faithful in time of necessity, and the seat of government removed thither. The site is without the walls of modern Cairo, and is marked by extensive mounds of rubbish.

In a.d. 652, the son of Tooloon, a Turkish slave who held a high office at Bagdad, was appointed governor of the province of Murs by the caliph Abd-al-Rahma, and two years after that of Alexandria also, by his successor El-Muhortede. His temporal allegiance to the caliph soon became merely nominal, and he was virtually sovereign of Egypt, but at the same time he endeavoured to avoid a complete rupture by continuing the prayer for the Princes of the Faithful in the mosques, and the mention of his name on the coins which he struck. Later in his reign, however, he forbade the mention of the caliph's brother and colleague El-Mowaffik in the prayers and gave himself the title of 'Amr Ibn-El-As. By permission of Omar, and El-Mukowkis, speaking of Pompey's Pillar, says, "It is said that this pillar is one of those which stood in the port of Alexandria, and that his academy contained a library which 'Amr Ibn-El-As had begun to adorn by direction of Omar." See Englishman in Egypt, vol. i, 60, seq.
of his own wealth and magnificence, still the largest mosque of Cairo, and, as presenting the study of the pointed arch, notable in the history of architecture. The reign of this vigorous and wise prince was remarkable for prosperity at home and conquests abroad. He took Baack, and in Syria in 274, captured Damascus, Hums (Kamesa), Hamah, and Aleppo; after which he proceeded to Antioch, and the governor refusing to surrender, he took that city by storm. He then advanced towards Damascus, but the supplies failing he was compelled to retire. About five years later, Lu-lu, his deputy and governor of Aleppo and other towns in Syria and in Mesopotamia, revolted and concluded a league with El-Muwaffak. It was apparently after an expedition against this rebel that Ahmad died, in the year 270 (A.D. 884).

During the latter years of his reign, he had subdued a plenty of life which had distinguished his youth, and had given himself up to boundless luxury. At his death, there was found in his treasury ten million gold pieces, and his establishment was discovered to consist of 7000 mounted muleteers, 300 packed horses for his own use, a body-guard of 24,000 slaves, besides 6000 asses and more than 10,000 camels, and 100000 horses. By what appears, the revenue necessary to maintain such a household was raised some idea may be formed, when it is stated that at the time of his death, the revenues of his kingdom were confined in Arab's present year.

Khumarraweyh, on the death of his father, was appointed his successor by the army, he being then twenty years old, and he inherited from him in an extended race of Euphrates to Syria in which his army guarded the vassal, although he himself, never having seen a battle before, fled the scenes of action in a panic, drawing a large part of his troops after him, and the latter, pursued the rambling policy of his father, and making peace with the caliph in 278 he not only put the latter's name with that of his brother El-Muwaffak in the public practice, but equally omitted his own; though it must be allowed he did not pursue the same servile course in his conge. On the accession of El-Muwaffak in 279, Khumarraweyh continued his policy and office and offered his daughter Kafi-en-Nedah (Wedwoura) in marriage to the caliph's son. In 283 he made an invasion into the Greek territory, and died at Damascus. It is said that he was fearful of assassination; to avoid which he had trained a man to guard him who slept on his bed of quicksilver. His fate was unjustified; for he was put to death by his women, or according to some by his eunuchs.

His eldest son, Geysh Abul-As'akir, not yet fourteen years old, succeeded him. This prince was killed in less than eight months, his youth, which rendered him unfit to govern, occasioned his fall; for he was seduced from his ascetic life by his father, and associated with none but worthless men. He was succeeded in 283 by his brother Hakoon, the principal events of whose reign were a great desert settlement, a navigation in Egypt, and a treaty which he concluded with the caliph, by which the provinces of Aswan and Kinnernoo were ceded to him and the annual tribute from Egypt was fixed at 450,000 dinars. He reigned upwards of eight years, but gave himself up to pleasure, and as some say, he was put to death in 292 by his uncle Shyibain and Adoo, sons of the founder of the dynasty, the former of whom succeeded to the government. In the meantime, at the instigation of the generals of Hakoon, Mohammad Ibn-Suleyman, a scion of Lu-lu, advanced upon Egypt with a numerous and heavily armed army. Shyibain went forth to meet him with all the forces he could muster, but numbers of his troops deserted to the invader, some to support their sovereign, others to avenger the former, in the year 345, a great fire occurred in El-Fustat, which destroyed 1700 houses and much merchandise; the caliph at once sent 356, and we have no account of the desolation in Egypt. Three years afterward, El-Muktefese wrote to him complaining of the rise of the Memluk dynasty, of which he was the head, and El-Muktefese immediately repaired to him to seek for aid of those who were in Egypt, of which the caliph was too timid to avail himself. About this time, also, he conducted a war with various success against Seyf-ed-Dowleh the Hamidotes, who had attacked Syria. He died at Damascus in 345 (A.D. 946), in the 56th year of his age, and was buried, as were his sons, the mosque of Omar at Jerusalem.

Of El-Ikhshad's two sons and successors, Abul-As'akir Ongoon (who died in 349), and Abul-As'akir 'Alee, little is known, their mother Kaffi, a black eunuch, was the regent of the former, in the year 345, a great fire occurred in El-Fustat, which destroyed 1700 houses and much merchandise; the caliph at once sent 356, and we have no account of the desolation in Egypt. Three years afterward, El-Muktefese wrote to him complaining of the rise of the Memluk dynasty, of which he was the head, and El-Muktefese immediately repaired to him to seek for aid of those who were in Egypt, of which the caliph was too timid to avail himself. About this time, also, he conducted a war with various success against Seyf-ed-Dowleh the Hamidotes, who had attacked Syria. He died at Damascus in 345 (A.D. 946), in the 56th year of his age, and was buried, as were his sons, the mosque of Omar at Jerusalem.

Hittito, with few exceptions, the most notable of which are the reigns of Ibn-Tooool, Khumarraweyh, El-Ikhshed, and Kaffo, the Muslim rulers of Egypt had not much benefited the country, or rescued it from thearchy and troubles in which it had become involved under the Lower Empire. But the incidents of the time are so little known that they have been deemed worthy of more notice in this article than any other of those of Ibn-Tooool, which were in favor with the caliph. In 356, El-Muktefese wrote to him asking for help, as well as other learned men, he rewarded with magnificent presents. On his death in 357, internal dissensions respecting the succession of Ibn-Tooool, a son of 'Alee, presented a favourable opportunity to the Fatimite caliph to renew the often-repeated invasions of Egypt.

The data of El-Ikhshed's reign is not much benefited by the country, or rescued it from thearchy and troubles in which it had become involved under the Lower Empire. But the incidents of the time are so little known that they have been deemed worthy of more notice in this article than any other of those of Ibn-Tooool, which were in favor with the caliph. In 356, El-Muktefese wrote to him asking for help, as well as other learned men, he rewarded with magnificent presents. On his death in 357, internal dissensions respecting the succession of Ibn-Tooool, a son of 'Alee, presented a favourable opportunity to the Fatimite caliph to renew the often-repeated invasions of Egypt.
But, while the conditions were being ratified, the Ikhaburees prevailed on the people to revoke their offer, and the ambassadors on their return were themselves compelled to seek safety in flight. Gohar pushed forward. Before El-Geesheh a fierce battle took place; several days were passed in skirmishes, and at length he forced the passage of the Nile a few miles south of that town. Instead of his troops, the Ikhaburees offered him a strong resistance, the greater part were dead on the field, and the remainder, taking what valuables they could carry off, fled for their lives. El-Geesheh was now brought to the terror of the inhabitants and the women of the fallen dynasty, and to the honour of the African general it is related that they were satisfied and the city was possessionally occupied. The dominion of the rest of Egypt was secured by this victory, and all the Hipsi, including the holy cities, and the Yemen, specially acknowledged the authority of the Fatimite El-Mo’izz. In the year 359 Syri had also added to his dominions, but shortly after was overrun by the Karmatrce (Carmathians), the troops of El-Mo’izz met with several reverses, Damascus was taken, and those lawless free-booters, joined by the Ikhaburees, advanced to ‘Yen-Shema. In the meanwhile, Gohar had fortified El-Kahureh,1 or Cairo (the new capital which he had founded immediately north of El-Fustat), and taken every precaution to repel the invaders, a bloody battle was fought near El-Kahureh, bringing with him the bodies of his three predecessors and vast treasure. El-Mo’izz reigned about two years in Egypt, dying in the year 365 H.S. He was, as a warlike and ambitious prince, but, notwithstanding, he was especially distinguished for justice and was fond of learning. He showed great favour to the Christians, especially to the Bishop of El-Ahmun. In the first days of his reign he entered Cairo on the 9th, before the city walls, without any decrees result. On the following Sunday, however, Gohar obtained a great victory over the enemy, and surrounded him more complete than any invasion, and suffered, and the camp beggar and fell into the hands of the conqueror.

The earnest solicitations of his lieutenant, who had ruled Egypt both ably and justly, with almost absolute authority, El-Mo’izz at length determined to remove his court to his new kingdom, and El-Kahureh was entered, and from this place to the life of the city, Gohar, when he founded that city, built the great mosque named El-Asur, the university of Egypt, which to this day is crowded with students from all parts of the Muslim world. The principal event of his reign in Egypt was the second invasion of Hasam, the Karmatean of Damascus. The enemy, as on the former occasion, reached ‘Yen-Shema, but now he gained more advantage over the African troops. Although he was twice defeated in different parts of Egypt, and at last turned back, in the advance, the capital was closely besieged by him, and its defenders were driven across the river. Thus surrounded, El-Mo’izz recurred to his earliest course of action, and succeeded in breaking Hassan Ibn El-Carnab (who, with a body of the tribe of Teu, fought with the Karmateans) to cultivated an ally of Hassan, before mentioned, had made himself master of Ramleh, and from this capital the regis might exercise his influence on her house, incurred her displeasure, and being fearful for her life, she secretly set forward, and by night concerted measures were taken by the chief of the guard, who very readily agreed to her plan. Ten slaves, bribed by 500 dinars each, having received their instructions, went forth on the 20th of the 1st of Ramada, in the year 370, to the city of Cairo, where El-Hukum, unattended, was in the habit of riding, and waylaid near the village of Huwm, where they put him to death. He was succeeded by his son, Edh-Dhibar (commonly pronounced El-Zahir) ill-lah Abu-Ibns ‘Alee, who ruled with justice and moderation for about sixteen years. In 414 Alepp was taken by Salih Ibn-Mardas, and although he was defeated and slain by an Egyptian force sent against him, a sheik-ed-Dowleh, yet retained possession of that city. But, while Hassan, of the tribe of Teu, before mentioned, had made himself master of Ramleh, and from this capital the reign occupied a long period, rendered remarkable by the unparalleled troubles which befell Egypt. It commenced prosperously with the defeat and death of Shihel-ed-Dowleh. The result of this was, that El-Mo’izz was again defeated and compelled to fly, this event, which occurred in the year 368, relieved Egypt of a terror, an ally of Hassan, by name Abd-Allah Ibn-Udoed-Allah (formerly governor of Syria under Kafour), and obtained for the arms of El-Mo’izz various successes in Syria.

El’Aziz Abu-Mansoor Nishr, on coming to the throne of his father, immediately dispatched an expedition against the Turkish chief El-Efkeeen, who had taken Damascus a short time previously. Gohar again commanded the army, and pressed the siege of that city so vigorously that the enemy called to their aid the Karmateans. Before this united army he retired by little and little to Accele, where he prepared to stand a siege; but being reduced to great straits, he purchased his liberty with a large sum of money. On his return from this disastrous campaign, El’Aziz took up his quarters in Damascus and sending the enemy at Ramleh was victorious after a bloody battle; while El-Efkeeen, being betrayed into his hands, was with Arab magnanimity reserved with him, and when he had gained a fair victory, the army returned in silence. El’Aziz followed his father’s example of liberality. It is even said that he appointed a Jew his vizir in Syria, and a Christian constable in the house of himself. These acts, however, cost him his life, and a popular tumult obliged him to disgrace both those offices. After a reign of twenty-one years of great internal prosperity, he fell in a battle near the blacks and Turks, both of whom had become numerous in Egypt. The former were succoured by the mother of El-Mutassar, whereafter a remarkable event, by which the immediate cause was more closely as usual. El-Bessacaree, a powerful Turkish chief excommunicated an exiled bishop in that city, had fallen into disgrace, and received supplies of men and money from the caliph of Egypt, and while the Scekeerei sultan Tshgri-Beg espoused the cause of the ‘Abbasieh caliph, he has been turned, and defeated El-Bessacaree, and sent Tshgri-Beg. El-Bessacaree entered Bagdad, in which the combat continued to rage; and the unfortunate El-Mutassar was slain, and the succeeding to the throne of El-Kahureh. El-Mutassan was solemnly declared Prince of the Faithful, and the insignia of the legitimate caliph was sent to El-Kahureh. The success of El-Bessacaree, however, was but transient; Tshgri-Beg had, in the meantime, defeated and killed his brother Ibraheem; he then entered Bagdad in Islam-kaadah 451, and surprised a force against El-Bessacaree, who fell in a battle near El-Korof.

A persecution of the Christians of Alexandria occurred about this time; and in 454 commenced a deplorable state of things between the blacks and the Turks, both of whom had become numerous in Egypt. The former were succoured by the mother of El-Mutassar,
His son El-'Amir bi-ahlami-Llah Abou-'Ameen Mansoor came to the throne at the age of five years, and until his death in 487, the government was conducted by El-'Afal. The first act of the caliph, however, on taking it into his own hands, was to put his minister to death, and appoint his uncle as his successor. The caliph was an able man, having reduced many of the principal coast-towns in Syria, mediated the conquest of Egypt, and crossed the frontier, but were encountered from the prosecution of these designs. El-Hafidh, whose death took place at El-Areesh, on his way back to Jerusalem. El-'Amir was put to death in 524. At the town of El-Geesh, it is said by partisans of El-Afdal, whose son then usurped the entire government, setting up, as caliph, El-Hafidh bi-deen-I-Llah Abd El-Messaad, a grandson of El-Mustansur (El-Amir having left no male issue), but without the usual ceremonies of installation. This vizir, Abou-'Ameen Ahmad, even forbade the mention of El-Hafidh in the public prayers, and inserted his own name in his stead. He perished in a popular tumult, raised by his extremities and arbitrary rule, and El-Hafidh was duly declared caliph and received the oaths of allegiance. After the death of Ahmad, he succeeded to the seat, but his reign was equaly refractory, and the people abandoned him, being exhausted, the worst of war, were depopulated, and that half the inhabitants of the town were dispersed by these bands. But the very portion of the population that inhabited the city, was given up to his oppression and arbitrariness. At length, his finding his power failing, gathered together the wealth he had amassed and fled to Syria, where he fell into the hands of the Chechen, and disposed of all that he had and detained him a prisoner. Eventually he was given up to Taise and cruised over the gates of the palace.

These events were occurring in Egypt, Syria was in a continual state of anarchy and war. A distinguished general, the ever Egypt, the Chechen, who by his oppression and cruelly miserly rendered El-Afdal, by nature benevolent and wise, as tyrannical as himself. He was assassinated after a year by the secret orders of the enemy, and succeeded in his place. At this time the well-known Shawar was governor of the B FIXED (or Upper Egypt), a post next in importance to that of prime minister. During the last three reigns the vizirs had been rapidly increasing in power; and the annals of the period are entirely occupied with the rise and fall of potent grandees, all eager for a post which conferred on its possessor the supreme authority. At length, in the reign of this unfortunate prince, they concerted the ruin of the dynasty and overwhelmed themselves in its fall. In 538 El-Afdal dispossessed Shawar of his government, and the latter had immediate recourse to arms, and marched against his enemy, succeeded in putting him to flight. He then constituted himself vizir, and compelled to fly to a more powerful rival, Ed-Dugham. Neor-Ed-Deen (Norouz), the sultan of Damascus, received the fugitive, assumed the crown; and in the course of the next year invaded an army to Egypt, under the command of Asad-el-Deen Sherkook, to remit him. In the meantime Ed-Dugham had been busy putting to death the great men of the empire; and having thus weakened his power, he offered but a feeble resistance, was overthrown in a battle near the Boukhay Salcic, on the S. of El-Kursh and Shawar was restored. No sooner, however, was this effected, than he forgot the engagements into which he had entered with Norouz, and threw off his allegiance to him. Sherkook retired to the Sherkook, and occupied the town of Bileba, and thence threatened Shawar. In this position of affairs the latter had recourse to the Crusaders, who willingly responded to his call, and Arsac, king of the Crusaders, assembled a formidable force. With these allies, Shewar beseiged his former protector in Bileba, until, hearing of Norouz's successes over the Franks in Syria, the sultan passed a peace, and permitted Shewar to withdraw from Egypt. About two years later, Norouz, determined on punishing the treachery of Shewar, assembled an army, and sent Sherkook into Egypt, beseiged by his nephew, the famous Saladin. Shrewar again sought to strengthen himself by an alliance with Arsac, from whom he received the first intimation. Appreciation of this knowledge of his movements, Sherkook changed his course from Bileba, entered the valley of the Nile at some distance above Cairo, and after marching northwards to El-Geesh. Here he endeavoured to raise the people against Shewar and his Frank confederates; and had in some measure succeeded when the superior forces of the enemy
compelled him to retreat southwards as far as El-Babyn, near Ashmoenyn, where he rallied an engagement, and gained a considerable victory. This success renewed to the weakness of the greater part of Egypt, and Alexandria itself fell into their hands. Saladin was placed in that city with a numerous garrison, and his uncle appointed to be their vicar, and the rest of Egypt. The Crusaders, however, at once closely invested Alexandria, and so pressed the town for three months, as to oblige Sheerkook to come to its relief. An honorable compromise was effected, and he himself fled alone on a dracary. After this, however, he gained some partial advantages over the Christians, till a terrible famine induced him two years later to conclude a truce with the king of Jerusalem and to retire to Egypt. In the year 576 he again entered Syria and made war on Kiiy-Aralin, the Seljook sultan of Anatolia, and on Leon, king of Armenia, the Cilician-Armenian kingdom, both of whom he forced to make terms of peace. Not long after his return, Saladin departed from Egypt (A.H. 578) to prosecute a war with the Crusaders in which neither side desired peace. Their hostility was aggravated by the following circumstances. A vessel bearing 1500 pilgrims had been wrecked near Damietta, and its passengers captured; and to the remonstrances of the king of Jerusalem the sultan replied by complaining of the constant forays made by Renaud de Châlillon. At this time the latter turbulent chief undertook an expedition against Eyleh, and for this purpose constructed boats at Karak and conveyed them on canals to the sea, but this flotilla was repulsed, and the siege raised by a fleet sent thither by El-Fard ("Saphedm"), the brother of Saladin, and then his viceroy; and a second attempt was still more unfortunate, the Christian captives on that occasion were sacrificed in the valley of Min. Having threatened Karak, Saladin encamped at Tiberias, and ravaged the territory of the Franks; he then besieged Beyroot, but in vain; and thence turned his arms against Mesopotamia and subdued the country, but the city of Mosul successfully resisted him. In the meanwhile, the Crusaders contended themselves with miserable forays across the enemy's borders, and made no serious preparations for the return of their redoubtable antagonist. The latter, having been almost everywhere successful in Mesopotamia, took Tell-Khalih and 'Eyn-Teb in Syria and obtained possession of Aleppo; he again besieged Karak, ravaged the territory of Samara, and later received the fealty of the lord of Mosul, but not the keys of the city. In the year 583 (1186 of our era) war again broke out between Saladin and the Crusaders. The sultan had respected a truce into which he had entered with Baldwin the Leper, and Renaud to the advantage of the Crusaders. The capture by the latter of a large caravan enraged Saladin, who despatched orders to all his lieutenants and vassals, summoning them to assemble in the "Holy War." He marched (A.D. 1187) from Damascus to Karak, and there laid close siege to Renaud, at the same time a large body of cavalry under the command of his son, El-Afdal, advanced on Nazareth; and here a body of 130 Knights Hospitalers and Templars, seconded by a few hundred foot soldiers, and encouraged by the heroic Jacques de Maile, marshal of the Temple, by their devotion immortalized their memory. Only the Grand Master of the Temple and two of his knights escaped from the unequal struggle. Soon after, Saladin approached in person at the head of an army of 80,000 men; and the Christians with their whole force encountered him on the shore of the Lake of Tiberias. The result of the battle which ensued was the heaviest blow which had yet fallen on the Crusaders. Weakened by thirst, shaken by the flight of a part of their troops on the second day of combat, and overwhelmed by numbers, the knights fought with desperate courage, but at last the prisoners were Guy VII. — 95
de Luigian (the king of Jerusalem and successor of Baldwin), with his brother and Renaud de Chatillon. The success was almost incredible; and the massacre of many of them is an unspeakable stain on the glory of the generally merciful Saladin. Tiberias, Ptolemaus (Acre), Nablus, Jericho, Ramleh, Caesarea, Arsur, Joppa, Beyrouth, and many other places successively fell into the hands of the conqueror. Tyre resisted his armament; and other strongholds (among others Karak) were surrendered on favourable terms, and the fall of Jerusalem crowned these victories. The great clemency of Saladin on this occasion is chronicled by Christian historians, though it is but slightly mentioned by the Muslims, who took offence at the mercy shown to the enemies of their faith.

After these events Tyre was again besieged, and when about to capitulate was relieved by the arrival of Conrad, son of the marquis of Montferrat. The valiant defence of the town wearied Saladin, who turned his arms against Tripoli; but here he met with no better success. Bologna, prince of Latium, and at that time protector of Tripoli also, was, however, glad to obtain a truce of eight months; and some strongholds (among others Karak) were taken. But now the fortune of war turned against the sultan. The ever-memorable siege of Acre, the signal victory over the sultan in the hands of the crusaders, which is an important and useful lesson against the princes of his family successively governed that country, and the enuch Karakooch, who also defended Acre, held a large share of authority.

On the death of Saladin, his extensive dominions were divided chiefly among his sons, and Egypt fell to the lot of one of them, El-Melik El-Aziz Imad-ed-Deen Othman. The grandees supported his claim to the throne, and he proved himself worthy of their choice. In conjunction with El-Aziz, we find him warring against the leaders of the Fourth Crusade. He reigned nearly six years, and was succeeded (in 595) by his son El-Mansoor Moham­med, whose uncle El-Afial was committed to prison. The government of Damascus and the assumption of the sultan. Having dethroned El-Mansoor, El-Afial formed an alliance against the sultan, with the ever-memorable siege of Acre, the signal victory over the sultan in the hands of the crusaders, which is an important and useful lesson against the princes of his family successively governed that country, and the enuch Karakooch, who also defended Acre, held a large share of authority.

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Damascus, and, in consequence of this alliance, Jerusalem, with its circuit, and the places between it and Joppa and Acre, Nazareth and the seven other cities of Galilee, with all the spread of coasts, was ceded to Frederick on the 20th of Feb. 1229. Between these two monarchs, exalted to the most friendly relations, presenting a curious spectacle in the midst of the intrigues and hatred of their subjects for each other, and endangering their popularity and even their lives, after various expeditions against his brother and his successors, Elyoob gained possession of Damascus, and died there in the year 635 (A.D. 1238). He was distinguished by military talents and rare moderation, and was also a learned man, a patron of the arts, and a good king.

His son, El-Melik El-Adil the Younger, was declared sultan of Egypt in the reign of Elyoob, and he carried on his wars against the Franks, and purposed the conquest of Egypt, the hostile armies met at Acre, and the Musulman soldiers of Elyoob desiring to form a bar of resistance on the sea, the Franks were routed. Negotiations for peace were then attempted, but these failing, the Franks were again induced to take the field by the cession of Jerusalem and other places. The king of Egypt, on his part, declared, in justice to the Sultan, when he had assuaged his implacable enmity, Damascus, which took Jerusalem and overran Syria. In the next campaign (642) they were joined by the army of Elyoob, under the command of Sheger-ed-Durr, who was destined to play a conspicuous part in Egyptian history. At Gaza the allied army met the Franks, eager to avenge themselves on the Khareem Khareem, who had been guilty in the preceding campaign, and willingly joined by the Muslim princes of Damascus, Homs, and Hama, on the first day they carried with decisive victory from daybreak to sunset, and was continued on the morrow until the prince of Homs, having lost 2000 men, gave way and fled towards Damascus. The Christians manifestly under the unequal fight with great constancy, and were only vanquished after the greater number had fallen. In these encounters, 20,000 men (and perhaps 30,000), two-thirds of the nobles, and heroically harnessed those munitions whose counsel he feared, and appointed creatures of his own. Oppressed by his tyranny, and impoverished by his wasting expenditure on fabulous conditions, his son Alee, ed-Deen Eybek to the throne, and he deposed and imprisoned El-Adil in the year 637, and to replenish his exhausted treasury, engaged to pay 400,000 livres as a ransom for himself and his army, 200,000 to be paid in Egypt, and the remainder on the fulfillment of certain stipulations at Acre. Damascus was surrendered in a few days, and the invasion of the Crusaders Sheger-ed-Durr, in order to strengthen herself on the throne, shortly after married the enemy Eybek, and caused him to be sent into the service of El-Melik El-Mansoor Noor-ed-Deen, when the battle of the year 648. The followers of the late Elyoob, however, obdurate Eybek to associate with himself in the sovereignty a young prince the grandson of Eybek, El-Meher, and the Tatars of Egypt evacuated. Sheger-ed-Durr, a son of El-Areeb, invaded Egypt, and after many combats was driven back to Syria, but he continued to exist, and kept several deserts of Egypt, and the next day landed opposite force and marched to meet him. Very severe the struggle, and the body of the enemy a ford over the canal of Thoron and Damascus, and, not trusting to the Memlouks, Damascus was set on fire. The forces of El-Melik El-Mansoor Noor-ed-Deen advanced towards Damascus, and his body-guard, who composed his army, the wretched emperor had, however, in the meantime recalled Hoolagoo, who left Kethba to encounter the Egyptian sultan. The battle declared in favour of the latter, and Syria was restored to his rule. Returning in triumph to Egypt, he was assassinated on the frontier by Beybars in the year 658, and this Memlouk (who had just recently bought under his banner against the Fatara) was forthwith chosen by the emirs to be his successor.

The brilliant reign of El-Melik Ed-dahar Beybars El-Baungdokhri is so peripatetic and fall of incident as to render a complete account of it very difficult. It began with the reduction of a revolt in Syria. The rebels were supported by Saladin under Hoolagoo, but Beybars was everywhere victorious, and Damascus surrendered at discretion. Having subdued all opposition in this quarter, he endeavoured to improve the conquests, the able El-Melik proclaimed himself sultan El-Melik El-Meher, Katt was begun by putting to death El-Mansoor and Sharaf-ed-Deen El-Mansoor and the kings of the latter dynasty. A reign thus cruelly commenced ended tragically. Katt was diverted from these severe measures by the advance of the Crusaders, and he sent to propose a truce, but not coming to terms he resolved on retreating to Damascus. A memorable conquest took place by land and sea, and St Louis with his troops surrendered themselves prisoners of war. Toen-Siah now gave himself up to debauchery, offended his nobles by bestowing his favours only on certain creatures whom he had brought with him from Mesopotamia, and alarmed the queen by bringing her to render him an account of his father's wealth. Sheger-ed-Durr appealed to the Memlouks, a conspiracy was formed, and the sultan was attacked in his palace. He fled to a pleasure-ground built on the banks of the Nile, which was set on fire in the presence of his army, the wretched king, from the summit, in vain promising to abdicate. He perished miserably, and his corpse lay unburied for many days on the bank. On his accession he had arranged a brother, and his fate deserves no pity.

Sheger-ed-Durr (vagarily called Shegeriy-ed-Durr), herself a slave, and the first of the Dynasty of the Bahrein,姬 tourists Memlouks, succeeded to the throne, and Izz-ed-Denn Eybek was appointed commander of the forces. After many delays, it was agreed to pay 400,000 livres as a ransom for himself and his army, 200,000 to be paid in Egypt, and the remainder on the fulfillment of certain stipulations at Acre. Damascus was surrendered in a few days, and the invasion of the Crusaders Sheger-ed-Durr, in order to strengthen herself on the throne, shortly after married the enemy Eybek, and caused him to be sent into the service of El-Melik El-Mansoor Noor-ed-Deen, when the battle of the year 648. The followers of the late Elyoob, however, obdurate Eybek to associate with himself in the sovereignty a young prince the grandson of Eybek, El-Meher, and the Tatars of Egypt evacuated. Sheger-ed-Durr, a son of El-Areeb, invaded Egypt, and after many combats was driven back to Syria, but he continued to exist, and kept several deserts of Egypt, and the next day landed opposite force and marched to meet him. Very severe the struggle, and the body of the enemy a ford over the canal of Thoron and Damascus, and, not trusting to the Memlouks, Damascus was set on fire. The forces of El-Melik El-Mansoor Noor-ed-Deen advanced towards Damascus, and his body-guard, who composed his army, the wretched emperor had, however, in the meantime recalled Hoolagoo, who left Kethba to encounter the Egyptian sultan. The battle declared in favour of the latter, and Syria was restored to his rule. Returning in triumph to Egypt, he was assassinated on the frontier by Beybars in the year 658, and this Memlouk (who had just recently bought under his banner against the Fatara) was forthwith chosen by the emirs to be his successor.

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and its territory was added to his dominions. A great scarcity of provisions and a threat of invasion affected Cairo in 662, and Baybars threw upon the Government the onus, and swore in every way to avert the sufferings of his subjects.

In 663 he again entered Syria, and took Caesarea and Umurof; and in the next year he commenced a series of campaigns against the Christians, notwithstanding the existence of a truce. He says the expenses of the war, he took occasion from the occurrence of many sedition fires in Cairo, during his absence, to annull their telegrams. A body of 500,000 demics,共计ing with the aid of his army, Baybars despatched a force which effected the conquest of Jerusalem, and then to the borders of Anatolia, a transient success which was speedily annulled by the advent of Alah Khan, the son of Hoolago.

The next war, Baybars again attacked the Christians, burning their churches and evicting the population, forcing Hissam and Hamsh, and thence returned to Cairo. After a campaign against the Tatars, he ravaged the country around Cairo (the burning of the villages, destroying human beings, and the like), and supported the optics of his actions, one commanded by himself in person, the other by Kala-oon El-Eldin. In the battle of Beyrah the sultan was captured, and this time he was not to escape the damage caused by these fires. He threatened and calmed, and relieved from the apprehensions caused by the advent of the Tatars by the death of Hoolago and the interest of his army, Baybars despatched a force which effected the conquest of Jerusalem, and then to the borders of Anatolia, a transient success which was speedily annulled by the advent of Alah Khan, the son of Hoolago.

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MEMLOOK SULTANS

EGYPT

now undisputed master of Egypt. He was the first prince of the Dynasty of Burgee or Cireman Memlooks. As the preceding dynasty was founded by the Turkish preachers of El-Sallih Egypt, so this dynasty was composed of the Cireman slaves whom those kings from time to time bought with the view of strengthening their power. They were originally placed in the character of a garison, or garrison of the place, hence their name Burgee, signifying 'of a tower or castle' It is worthy of remark that, while many of the sultans of both these dynasties were foremost ten men against the Turks, many of the latter met with a violent death, but few of the latter. The reign of Barkook is memorable for his war with Teemoor, or Teemoor-ling, commonly called by us Tangerian, who had extended his conquests towards his dominions, but found him not unprepared, for he had foreseen the threatened danger. In the year 795, Kars-Yossuf, Lord of El-Melesche, and Ahmad Isla'meh, a similar personage to Barkook, were descended to the sword, and Aleppo was the scene of the battle, when the Turks were repulsed, and returned with the spoils they had committed, and possession the military talents of Farag were not sufficient to offset his severity. He seems to have been fond of riches and display, and he certainly left his treasury in a very flourishing condition, besides much wealth in stores, slaves, horses, and the like.

His son, El-Melahk En-Na'sr Abu-S-Salih Farag, fell a prey to unexpected sickness and the usual weakness of, but he outlived the sultan, his kingdom. He died suddenly in 801, much beloved by his subjects and regarded by less powerful chiefs as their strongest bulwark against the Fatir monarch. He was called 'Shaykh,' for his wisdom and learning, and combated with those qualities those of a skilful general and a good king. He was active, wary, and the most capable of his age, and possessed the various qualities that distinguished him out the seventy. He seems to have been fond of riches and display, and he certainly left his treasury in a very flourishing condition, besides much wealth in stores, slaves, horses, and the like. The next sultan, El-Melahk En-Na'sr Abu-S-Salih Farag, was proclaimed king by Barkook's adherents, and concluded a treaty with the sultan of Egypt.

His design against Indus diverted Teemoor from his projects in Syria, but Barkook continued his venture and every means he could devise to insurrection the sultan's dominions. He was sulla's behind him, and Ahmad Isla'meh, a similar personage to Barkook, were descended to the sword, and Aleppo was the scene of the battle, when the Turks were repulsed, and returned with the spoils they had committed, and possession the military talents of Farag were not sufficient to offset his severity. He seems to have been fond of riches and display, and he certainly left his treasury in a very flourishing condition, besides much wealth in stores, slaves, horses, and the like.

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Egypt

This event took place on the 29th of Regeb 922 (A.H. 1516) with the treaty of Belqas, by which the Egyptians lost their independence. The shattered remains of the army collected in Cairo. Tolunay Bey, a nephew of the deceased king, was elected sultan, and at once determined on every resource to the conqueror. His general in Syria, El-Gambardes, disputed the road with Selim step by step, and at last after arreling near Cairo, commanded the retreating Turks, and the brilliant bravery of the Memlooks availed them not, immense numbers of them were slain by their enemies in the pursuit, and the survivors, El-Gambardes, however, secured his name by joining the victor. The Turkish army paused for rest; and time was thus given to Tolunay Bey to hire Arabs at a great cost to replenish his thinned ranks. Selim now passed to the west of Cairo. A night surprise conducted by Tolunay failed, but he succeeded in putting to the sword a great many Turks. He fortified himself in the city, and a house-to-house combat ensued, the Memlooks defending every foot with the energy of despair; the battle fell by assault, and the unfortunate Tolunay expired in the arms of his Egyptians; but on the way he was taken by Arabs, given up to El-Gambardes and another, and brought in chains to Selim, who at first received him with honour, but afterwards falsely accused him of conspiring against him, and, with the cruelty and perfidy characteristic of his race, hung him over the Bab-Zawyleh, the place of execution for common felons. Thus miserably perished the last independent ruler of Egypt, who possessed the best qualities of his line, and whose noble defence of his kingdom would have secured to him the commendation of any but a Turk.

In reviewing the period during which Egypt was governed by independent Muslim princes, it is necessary to consider the spirit of the times and the people over whom they ruled. They succeeded to the government of countries worn out by incessant warfare, overrun by savage hordes, and debased by the rule of the Lower Empire. Egypt had long struggled against the slavery to which it was condemned, and the history of the last three dynasties of Pharaohs vivified Cairo. But the house of Eiyyub it attained its greatest military glory under the Benee-Tooroos and the Ikhsheedeeyeh) from profiting by the enlightenment of the race who held the dominion over it, until the conquest by the Fatimees. The caliphs of that dynasty contributed in a great degree to restore to Egypt its ancient portion of its ancient glory, and with the house of Eiyyub it attained its greatest military glory under the Muslims; but the edifices erected during the rule of the two dynasties of Memlook kings, the libraries collected in Cairo at that period, and the learned men who then flourished would point to it as the age in which literature and arts were cultivated with the most success, a sure evidence of the internal prosperity of any country. This is the more surprising when we consider the state of Syria, which had long before its accession fallen a prey to intestine wars and the ravages of the Tartars, the Crusaders, and other invaders, and also bear in mind the constitution of their government, in which the more powerful chiefs were constantly aiming at the supreme authority; and the practice of purchasing memlooks, and rearing them in the households of the great to enable their masters to maintain their ascendancy augmented the number of these aspirants to the throne. These slaves were, unlike the Bahaeeeyeh, the Turkish Memlooks of Es-Saith Eiyyub, chiefly Circassians, who afterwards composed the Second (or Burge) Dynasty. Many of the Memlook sultans railed in military achievements the great Saladin, and even penetrated further than he in their foreign expeditions. In Cairo the still seen the finest specimens of Arab architecture, almost all dating during the period comprised under the domination of the two Memlook dynasties; the libraries of the mosques, and the private collections of this city, though grievously injured since the Turkish conquest, are or very recently were the best and most considerable of those of Egypt or Syria; and, as before remarked, the university El-Azhar is still, owing to the fostering care of these sultans, the principal seat of learning of the Eastern world.

In this sketch of the history of Egypt we have given no account of the state of commerce, taxation, &c., under the Muslims. Those only who have read the Arab histories of this and other Eastern countries can appreciate the general futility of the conclusions based on their authority.

It would be tedious and unprofitable to follow the details of Turkish misrule and tyranny which are from this time presented to the student of Egyptian history. Although Selim had apparently destroyed the power of the Memlooks, he thought it prudent to conciliate them, and appoint twenty-four beys over the military provinces of that number into which he divided Egypt, subject to the supreme control of a pasha, whose council was formed of seven Turkish chiefs (oaklees), while one of the beys held the post of Sheykh El-Beled, or Governor of the Metropolis, an officer who became an object of hatred to the other chiefs. This system was begun by Selim, and completed by his successor. For nearly two centuries the successive pashas were mostly obeyed; but the ambition of becoming Sheykh El-Beled was the fruitful cause of intrigue and murder. The Memlooks who then held power in Egypt were called the Ghuzz, that being the name of the tribe to which they are said to have at first generally belonged; and they continually bought slaves, of Circassian or Georgian race, to supply the place of children, for they did not intermarry with natives of Egypt, and women of more northern climates are generally either barren or bear sickly offspring in that country. Thus they lacked the surest source of power; few possessed any family ties; but at the same time the slaves in general were remarkably faithful to their patrons. After two centuries, the beys gradually increased in power, until the authority of the pasha was almost nominal, and the government became a military oligarchy. This brings us to the rise of the celebrated Ali Bey. He was created Sheykh El-Beled in A.H. 1177; but, having revenged himself on an old enemy who had assassinated Ali's master, to whom he owed his elevation to the rank of bey, he shortly after fled to Syria, and took refuge with the governor of Jerusalem, and thence went to Acre, where the Sheykh Dhahir became his friend; and that same year he returned to Cairo in his former capacity of Sheykh El-Beled. In 1179 his enemies again compelled him to flee, and he betook himself this time to El-Yemen, once more to return to Egypt; after which he gained increased power. His favourite memlook, Muhammad Aboob-Dahabab, proved ungrateful, and, while enjoying the highest power, entered into a conspiracy against his life; but after receiving the presents of the hostile beys, he denounced them to his master, who would not listen to warnings of his meditated treachery.

In the year 1182 (A.D. 1768) the Porte demanded the assistance of Ali Bey in the Russian war, an order which he was about to obey, when he was apprised of the departure of a messenger with a firman demanding his head, he having been falsely accused of intentions to aid the Russians and throw off his allegiance. He caused the bearer of this order to be waylaid and put to death, and having possessed himself of the firman, he continued...
vened the beys, showed them the document, and aided by those of his own household persuaded the council to expel the pasha, and declare Egypt independent. The Sheykh Dhaahir took part in this rebellion, and the pasha of Damascus was beaten by him between Mount Lebanon and Tiberias. A period of good but vigorous government and of tranquillity followed these events in Egypt, notwithstanding the very heavy imposts levied for the replenishment of the treasury; and Ali's generals gained for him extended power abroad. Mohammad Abou-Dhahab was despatched to Arabia, and entered Mecca, where the Shereef was deposed; and another bey traversed the eastern shores of the Red Sea. After the expedition to Arabia, Mohammad Bey marched into Syria to assist the Sheykh Dhaahir against the Porte, and the co-operation of the Russans was demanded. A successful campaign terminated before the walls of Damascus, the siege of which was abandoned when nearly brought to a close, and Mohammad Bey returned with large forces to Egypt. This man, loaded with benefits by his patron, now openly rebelled; and being joined by Ali's enemies, at the head of 5000 men was Ismail, chief of the guard, he advanced on Cairo, and Ali escaped to his steady ally, Sheykh Dhaahir, the prince of Acre. These events took place the year 1186. Mohammad Bey was then declared Sheykh el-Beled. Ali Bey, in the meanwhile, in conjunction with his ally, gained various advantages in Syria, and, on the information that his return was desired in Egypt, he collected a small force, assisted by Sheykh Dhaahir and a Russian squadron, and determined on attempting to recover his power. He, however, fell into an ambuscade near Es-Sakkaryeh, and was wounded by one of his moollahs named Murad (afterwards Murad Bey), carried to the citadel, and poisoned by Mohammad Bey. Thus terminated the career of the famous Ali Bey, a man whose energy, talents, and ambition bear a strong resemblance to those of the latter Mehemet Ali. Mohammad Bey continued Sheykh el-Beled, tendered his allegiance to the Porte, and was invested with the pashalik. He then entered Syria, and severely chastised Sheykh Dhaahir, taking Gaza, Joppa, and Acre itself. Joppa was taken by assault, and suffered a massacre of its inhabitants, and Acre was pillaged. At the latter place the pasha suddenly died. His mosque in Cairo is the latest fine specimen of Arab architecture, and is not unworthy of its better days.

The chief competitors for power were now Ismail, Ibrahim, and Murad. The first of whom was speedily expired in the contest continued between the two latter beys. Ibrahim at length succeeded in casuing himself to be proclaimed Sheykh el-Beled, and Murad contended himself with the office of Emoor el-Hagg, or chief of the pilgrims; but this arrangement was not destined to be of long continuance; a violent quarrel resulted in a recourse to arms, and that again in a peace of three years' duration, during which the two beys held an equal sway. In the year 1200 the Porte despatched Hassan Capitan (properly Kapoodan) Pasha (or High Admiral), with a Turkhah force, to reduce the turbulent Moollahs to obedience, and to claim the annual tribute. Murad Bey was overtaken at El-Beled, and the Turks advanced to Cairo, desolating the country, and acting according to their almost invariable practice on such occasions. The metropolis opened its gates to Hasam Pasha, who determined on pursuing the beys to Upper Egypt, whether he despatched a large portion of his army, and a sailing squadron, or took place, but a war with Russia recalled this commander to Constantinople. Ismail was again created Sheykh el-Beled, and he held that post until the terrible plague of the year 1205, in which he perished, and hence it is commonly called the "Plague of Ismail." His death caused the return of Ibrahim and Murad; and

eight years after, intelligence of the arrival at Alexandria of a French army of 36,000 men, commanded by General Bonaparte, united these chiefs in a common cause.

On the 18th May 1798, this expedition, consisting of 13 sail of the line, 6 frigates, and 12 vessels of a smaller size, sailed from Toulon, and made the coast of Egypt on the 1st July. The troops were landed near Alexandria, and the city fell by assault on the 5th of that month. The French conquest and occupation of Egypt belong to European history; a recapitulation of the principal events of the period will therefore suffice in this place. The Memlooks affected to despise their antagonist, and hastened to chastise him; at Shibrrees they attacked the French and were repulsed; but, nothing discouraged, they collected all their forces, exceeding 60,000 men, under the command of Murad, and entrenched themselves at Embabeh, opposite Cairo. Here was fought the battle which has been dignified with the name of that of the Pyramids. European tactics completely bewildered the Memlooks: their famous cavalry was received on the bayonets of the French squares; a galling fire of grape and musketry mowed down their ranks; and of this great army only about 2500 horses escaped with Murad Bey, while 15,000 men of all arms fell on the field of battle. Having made himself master of Cairo, Bonaparte despatched General Desaix to effect the conquest of Upper Egypt, and the success of the Eastern expedition seemed secured. But ten days after the victory of Embabeh, the battle of the Nile annihilated the French fleet in Abooe-Keer (Aboukir) Bay, and most materially influenced the future conduct of the war. On this point, Napoleon himself says, "La perte de la bataille d'Aboukir eut une grande influence sur les affaires d'Egypte et même sur celles du monde; la flotte française ayant, l'expédition de Syrie n'opposant point d'obstacles, l'artillerie de siège se transportait sûrement et facilement au-delà du désert, et Saint-Jean-d'Acre n'arrêterait point l'armée Françoise. La flotte Française détruite, le divan s'enthousiasme à déclarer la guerre à la France. L'armée perdit un grand appui, sa position en Egypte changea totalement, et Napoleon dut renoncer à l'espoir d'assouvir à jamais la puissance Française dans l'Orient par les résultats de l'expédition d'Egypte."

The disastrous expedition into Syria, undertaken for the purpose of frustrating the efforts of Sir Sydney Smith before Alexandria, and of Jozzár Pasha, who was advancing from Acre, still further obscured Napoleon's prospects in the East, and the victory soon after obtained by him over the Ottoman army at Abooe-Keer, the second defeat of Murad Bey, and various successes over the Turks, enabled the French general Kleber (Napoleon having left for Europe after the first of these events) to set on foot negotiations for an honourable evacuation of the country. But when the convention was already signed, and the French were about to quit Cairo, Lord Keith signified to Kleber that Great Britain would not consent to the terms of the treaty; and although this refusal was afterwards rescinded, Kleber considered that the withdrawal came too late: he totally defeated 70,000 men under the grand vizir at Heliopolis, and returned to Cairo to quell an insurrection of the inhabitants. This distinguished officer was about this time assassinated in the garden of his palace by a fanatic, who was impaled in the great square (then a lake) called the Esbakeeyeh, in Cairo, and mournfully lingered for the space of three days before death put an end to his sufferings. Under Kleber's administration, Egypt began to resume its former prosperity; by his conciliatory and good government much prejudices against the French was overcome; by ceding a part of Upper Egypt to Murad, he gained the good will of that chief, who gave him no cause to regret.  

1 Napoleon, Mémoires, t. ii.
this politic step; while under his auspices the "savans" of the Institute of Egypt collected the valuable mass of information embodied in the "great French work," the Description de l'Egypte.

On the death of Kleber, General Menou succeeded to the command, and although he afterwards conducted the defence of the country with much valour, yet to his judgment in administration and his want of military talent, we must mainly ascribe the determination of the British Government to attempt the expulsion of the French from Egypt, and the rapid success of the campaign that ensued. On the 2d of March 1801 an army under Sir Ralph Abercromby arrived in Aboo-Keer Bay, and made good a landing in the face of a well-disposed French force, which offered every possible resistance. The memorable battle of Alexandria, in which Abercromby fell, decided the fate of the war. A bold march, executed with talent, effected the capitulation of Cairo; Alexandria surrendered on the 1st of September, and the French sailed from the shores of Egypt in the course of that month. General Hutchinson had taken the command of the English expedition, afterwards reinforced by a detachment from India under General Baird; and the army of the grand vizir, and that of the capitam-pasha, with the troops of Ibrahim Bey (for Khusruf, having died of the plague), had co-operated in the measures which led to the evacuation of the country by Menou.

The history now requires that we should mention the early career of a man who subsequently ruled the destinies of Egypt for a period of nearly forty years. Mehemet Ali Pasha was born in A.H. 1182 (A.D. 1768-9) at Cavalla, a small sea-port town of Albania. On the death of his father, in early life, he was brought up in the house of the governor of the town, who, as a reward for military prowess, gave him his daughter in marriage. By her he had, it is said, his three eldest sons, Ibrahim, Tocsoon, and Ismail. Having attained the rank of bahlit-bashhe (or head of a body of infantry), he became a dealer in tobacco, until, in his thirty-third year, he was despatched to Egypt with his patron's son, Ali Agha, and 300 men, the contingent furnished by his native place to the Turkish government, under the French, and soon after his arrival in that country he succeeded, on the return of Ali Agha, to the command, with the nominal rank of beeibashshe (or chief of a thousand men).

Soon after the evacuation of Egypt by the French, that unfortunate country became the scene of more severe troubles, in consequence of the unwarrantable attempts of the Turks to destroy the power of the Ghuzz. In defiance of promises to the English Government, orders were transmitted from Constantinople to Hoseyn Pasha, the Turkish high admiral, to ensnare and put to death the principal boys. Invited to an entertainment, they were, according to the Egyptian contemporary historian El-Gebarte, attacked on board the flagship; Sir Robert Wilson and M. Mengin, however, state that they were fired on, in open boats, in the bay of Aboo-Keer. They offered an heroic resistance, but were overpowered, and some made prisoners, some killed, while some, including the afterwards celebrated Osman Bey El-Bardeese, escaped in a boat, and sought refuge with the English, who at that time occupied Alexandria. General Hutchinson, informed of this treachery, immediately assumed threatening measures against the Turks, and in consequence, the killed, wounded, and prisoners were given up to him. Such was the commencement of the distressing struggle between the Memlooks and the Turks. Mohammad Khursuf was the first pasha after the expulsion of the French. The form of government, however, was not the same as that before the French invasion, for the Ghuzz were not reinstated. The pasha, and through him the sultan, endeavoured on several occasions either to ensnare them or to beguile them into submission; but these efforts failing, Mohammad Khursuf took the field, and a Turkish detachment 14,000 strong, despatched against them to Demeenoor, whither they had descended from Upper Egypt, was defeated by a small force under El-Effee; or, as Mengin says, by 800 men left by El-Effee under the command of El-Bardeese. Their ammunition and guns fell into the hands of the Memlooks.

In March 1803 the British evacuated Alexandria, and Mohammad Bey El-Effee accompanied them to England to consult respecting the means to be adopted, or restoring the former power of the Ghuzz. About six weeks after, the Arnaoot (or Albanian) soldiers in the service of Khursuf tumultuously demanded their pay, and surrounded the house of the defterdar, who in vain appealed to the pasha to satisfy their claims. The latter opened fire from the artillery of his palace on the insurgent soldiery in the house of the defterdar, across the Esbekeyeh. The citizens of Cairo, accustomed to such occurrences, immediately closed their shops, and the doors of the several quarters, and every man who possessed any weapon armed himself. The tumult continued all the day, and the next morning a body of troops sent out by the pasha failed to quell it. Tahir, the commander of the Albanians, then repaired to the citadel, gained admittance through an embrasure, and, having obtained possession of it, began to cannonade the pasha over the roofs of the intervening houses, and then descended with guns to the Esbekeyeh, and laid close siege to the palace. On the following day, Mohammad Khursuf made good his escape, with his women and servants and his regular troops, and fled to Damietta by the river. This revolt marks the commencement of the rise of Mehemet Ali to power in Egypt, and of the breach between the Arnaoots and Turks which ultimately led to the expulsion of the latter.

Tahir Pasha assumed the government, but in twenty-three days he met with his death from exactly the same cause as that of the overthrow of his predecessor. He refused the pay of certain of the Turkish troops, and was immediately assassinated. A desperate conflict ensued between the Albanians and Turks; and the palace was set on fire and plundered. The masters of Egypt were now split into these two factions, animated with the fiercest animosity against each other. Mehemet Ali became the head of the former, but his party was the weaker, and he therefore entered into an alliance with Ibrahim Bey, and Osman Bey El-Bardeese. A certain Ahmed Pasha, who was about to proceed to a province in Arabia, on which he had been appointed governor, was raised to the important post of pasha of Egypt, through the influence of the Turks and the favour of the shekhs; but Mehemet Ali, who with his Albanians held the citadel, refused to assent to their choice; the Memlooks moved over from El-Geezeh, and Ahmad Pasha betook himself to the monastery of Ez-Zahir, which the French had converted into a fortress. He was compelled to surrender by the Albanians; the two chiefs of the Turks who killed Tahir Pasha were taken with him and put to death, and he himself was detained a prisoner. In consequence of the alliance between Mehemet Ali and El-Bardeese, the Albanians gave the conqueror to the Memlooks; and soon after, these allies marched against Khursuf Pasha, who having been joined by a con-

1 Very many of the French had either married Memlook women, or bought concubine slaves of the same faith, whom, on their departure, they left behind them; and these unfortunate were forthwith tied up in necks and downed.
2 Ibrahim is, however, believed by many, or most, to have been the wife's son by a former husband.
siderable body of Turks, and being in possession of Damietta, was enabled to offer an obstinate resistance. After much loss on both sides, he was taken prisoner and brought to Cairo; but he was treated with respect. The victorious soldiery sacked the town of Damietta, and were guilty of the barbarities usual with them on such occasions.

A few days later, Ali Pasha El-Tarabulusee landed at Alexandria with an imperial frigate, constituting him pasha of Egypt, and threatened the Beys, who now were virtual masters of Upper Egypt, as well as of the capital and nearly the whole of Lower Egypt. Mehemet Ali and El-Bardeesee therefore descended to Rosetta, which had fallen into the hands of a brother of Ali Pasha, and having recovered the town and captured its commander, El-Bardeesee purposed to proceed against Alexandria; but the troops required arrears of pay which it was not in his power to give, and the pasha had cut the dyke between the Lakes of Aboo-Keer and Mareehs, thus rendering the approach to Alexandria more difficult. El-Bardeesee and the Mehemet Ali therefore returned to Cairo. The troubles of Egypt were now increased by an insufficient inundation, and great scarcity prevailed, aggravated by the exorbitant taxation to which the Beys were compelled to resort in order to raise money to pay the troops; while murder and rapine prevailed to a frightful extent in the capital, the riotous soldiery being under little or no control. In the meantime, Ali Pasha, who had been behaving in an outrageous manner towards the Franks in Alexandria, received a khatt-i-shereef from the sultan, with an annual pension each of fifteen purses and other privileges, but that the government should be in the hands of the pasha. To this the Beys assented, but with considerable myrmogryves; for they had intercepted letters from Ali to the Albanians, endeavouring to alienate them from their suzerain, and thus securing the assistance of the Beys. Desperate answers were returned to these, and Ali was induced by them to advance towards Cairo at the head of 2500 men. The forces of the Beys, with the Albanians, encamped near him at Shalaklem, and he fell back on a place called Zafyeteel. They next seized his boats conveying soldiers, servants, and his ammunition and baggage; and, following him, they demanded whither he brought with him so numerous a body of men, in opposition to usage and to their previous warning. Finding they would not allow his troops to advance, forbidden himself to retreat with them to Alexandria, and being surrounded by the enemy, he would have hazarded a battle, but his men refused to fight. He therefore repaired to the camp of the Beys, and his army was compelled to retire to Syria. In the hands of the Beys, Ali Pasha again attempted treachery. A horseman was seen to hand him an order one night at full gallop; he was the bearer of a letter to Osmany Bey Hassan, the governor of Kne. This offered a fair pretext to the Memlooks to rid themselves of a man whose antecedents and present conduct proved him to be a perfidious tyrant. He was sent under a guard of forty-five men towards the Syrian frontier; and about a week after this news was received that in a skirmish with some of his own soldiers he had fallen mortally wounded.

The death of Ali Pasha produced only temporary tranquillity; in a few days the return of Mohammed Bey El-Effie (called the Great or Eldee) from England was the signal for fresh disturbances, which, by splitting the Ghuzz into two parties, accelerated their final overthrow. An ancient jealousy existed between El-Effie and the other most powerful bey, El-Bardeesee. The latter was now supreme among the Ghuzz, and this fact considerably heightened their enmity. While the guns of the citadel, those at Mass El-Ateekah, and even those of the palace of El-Bardeesee, were three fired in honour of El-Effie, preparations were immediately commenced to oppose him. His partisans were collected opposite Cairo, and El-Effie was driven away; but he still held El-Geezeh among them; Hoseyn Bey El-Effie was assassinated by emissaries of El-Bardeesee, and Mehemet Ali, with his Albanians, gained possession of El-Geezeh, which was, as usual, given over to the troops to pillage. In the meanwhile El-Effie made a great embarkation at Rosetta, and not apprehending opposition, was on his way to Cairo, when a little south of the town of Manoof he encountered a party of Albanians, and with difficulty made his escape. He gained the eastern branch of the Nile, but the river had become dangerous, and he fled to the desert. There he had several hard-breadth escapes, and at last secreted himself among a tribe of Arabs at Ras-el-Wads. A change in the fortune of El-Bardeesee, however, favoured his plans for the future. That chief, in order to satisfy the demands of the Albanians for their pay, gave orders to levy heavy contributions from the citizens of Cairo; and this new oppression aroused them to rebellion. The Albanians, alarmed for their safety, assured the populace that they would not allow the order to be executed; and Mehemet Ali himself caused a proclamation to be made to that effect. Thus the Albanians became the favourites of the Beys and took advantage of their opportunity. Three days later they beset the house of the aged Ibrahim Bey, and that of El-Bardeesee, both of whom effected their escape with difficulty. The Memlooks in the citadel directed a fire of shot and shell on the houses of the Albanians which were situated on the Ezbekkeyeb; but on hearing of the flight of their chiefs, they evacuated the place; and Mehemet Ali, on gaining possession of it, once more proclaimed Mahomet Khursuf pasha of Egypt. For one day and a half he enjoyed the title; the friends of the late Tahir Pasha then accomplished his second degradation, and Cairo was again the scene of terrible enormities, the Albanians ravelling in the houses of the Memlooks chiefs, whose hareems met with no mercy at their hands. These events were the signal for the reappearance of El-Effie.

The Albans now invited Ahmad Pasha Khursheed to assume the reins of government, and he without delay proceeded from Alexandria to Cairo. The forces of the partisans of El-Bardeesee were ravaging the country a few miles south of the capital and intercepting the supplies of corn by the river, a little later they passed to the north of Cairo and succeeded by the encirclement he would have hazarded a battle, but his men refused to fight. He therefore repaired to the camp of the Beys, and his army was compelled to retire to Syria. In the hands of the Beys, Ali Pasha again attempted treachery. A horseman was seen to hand him an order one night at full gallop; he was the bearer of a letter to Osmany Bey Hassan, the governor of Kne. This offered a fair pretext to the Memlooks to rid themselves of a man whose antecedents and present conduct proved him to be a perfidious tyrant. He was sent under a guard of forty-five men towards the Syrian frontier; and about a week after this news was received that in a skirmish with some of his own soldiers he had fallen mortally wounded.

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on both sides. This reverse in a measure united the two
great Mameluk parties, though their chiefs remained at
enmity. El-Bakoury, however, passed to the south of Cairo, and
the Ghuzza gradually retreated towards Upper Egypt.

Neither the pasha despatched three successive expeditons
(one of which was commanded by Mehemet Ali); and many
battles were fought, but without decisive result.

At this period another army befell Egypt; about 3000
Deless arrived in Cairo from Syria. These troops had been
sent for by Khurshedd in order to strengthen himself
against the Albanians; and the events of this portion of
the history afford sad proof of their ferocity and brutal
enmities, in which they far exceeded the ordinary Turkish
soldiers and even the Albanians. Their arrival immediately
recalled Mehemet Ali and his party from the war, and in-
stead of aiding Khurshedd was the proximate cause of his
overthrow.

Cairo was ripe for revolt; the pasha was hated for his
tyranny and extortion, and execrated for the deeds of his
troops, especially those of the Deless; the sheyks enjoyed
the people to close their shops, and the soldiers clamoured
for pay. At this juncture a firman arrived from Constantin-
ople conferring on Mehemet Ali the pashalik of Jiddeh;
but the occurrences of a few days raised him to that of
Egypt.

On the 12th of Safar 1220 (May 1805) the sheyks,
with an immense concourse of the inhabitants, assembled
in the house of the kadee; and the 'Ulemâ, amid the
prayers and cries of the people, wrote a full statement of
the heavy wrongs which they had endured under the
administration of the pasha. The 'Ulemâ, in answer, were
determined to go to the citadel; but they were apprised of
treachery; and on the following day, having held another
ouncil at the house of the kadee, they proceeded to
Khurshedd, and informed him that the people would no
longer submit to Khurshedd. "Then whom will ye have?"
said he. "We will have thee," they replied, "to govern
us according to the laws; for we see in thy countenance
that thou art possessed of justice and goodness." Mehemet
Ali seemed to hesitate, and then complied, and was at once
invited. On this, a bloody struggle commenced between
the two pashas. Cairo had before experienced such conflicts
in the streets and over the house-tops, but none so severe
as this. Khurshedd, being informed by a messenger of the
insurrection, immediately laid in stores of provisions and
ammunition, and prepared to stand a siege in the citadel.
Two chiefs of the Albanians joined his party, but many of
his soldiers deserted. Mehemet Ali's great strength lay in
the devotion of the citizens of Cairo, who looked on him as
their future deliverer from their afflictions; and great num-
bers armed themselves, advising constantly with Mehemet
Ali, having the sayyid 'Omar and the sheyks at their head,
and guarding the town at night. On the 19th of the same
month, Mehemet Ali besieged Khurshedd. Retrenchments
were raised, and the lofty minaret of the mosque of the
sultan Hasan was used as a battery whence to fire on
the citadel; while guns were also posted on the mountain
in its rear. After the siege had continued many days, Khur-
shedd gave orders to cannonade and bombard the town; and
for six days his commands were executed with little interrup-
tion, the citadel itself also lying between two fires. Meth-
emet Ali's position at this time was very critical; his troops
became mutinous for their pay; the sâlihâr, who had com-
manded one of the expeditions against the Ghuzza, advanced
to the relief of Khurshedd; and the latter ordered the Deless
to march to his assistance. The firing ceased on the Friday,
but recommenced on the eve of Saturday and lasted until
the next Friday. On the day following, news came of the
arrival at Alexandria of a messenger from Constantinople.
The ensuing night in Cairo presented a curious spectacle;
many of the inhabitants gave way to rejoicing, in the hope
that this envoy would put an end to their miseries, and
fire off their weapons as they paraded the streets with
bands of music. The sâlihâr, imagining the noise to be a
fray, marched in haste towards the citadel, while its
garrison saluted forth, and commenced throwing up
rocks and stones in the quarter of Arab-el-Yend, but was
repulsed by the armed inhabitants and the soldiers stationed
there; and during all this time, the cannonade and
bombardment from the citadel, and on it from the batteries
on the mountain, continued unabated.

The envoy brought a firmân confirming Mehemet Ali,
and ordering Khurshedd to repair to Alexandria, there to
await further orders; but this he refused to do, on the
ground that he had been appointed by a khâtîr-ahereef.
The firing ceased on the following day, but the troubles of
the people were rather increased than assuaged; murders
and robberies were daily committed by the soldiery, the
houses of certain sheyks were all shut and some were fired.

While these scenes were being enacted, El-Efseef was
besieging Demenhoor, and the other boys were returning
towards Cairo, Khurshedd having called them to his
assistance.

Soon after this, a squadron under the command of the
Turkish high admiral arrived in Alexandria. The pasha
despatches confirmatory of the firmân brought by the
former envoy, and authorizing Mehemet Ali to continue to
discharge the functions of governor for the present.
Khurshedd at first refused to yield; but at length, on con-
dition that his troops should be paid, he evacuated the
citadel and embarked for Rosetta.

Mehemet Ali now possessed the title of Governor of
Egypt, but beyond the walls of Cairo his authority was
everywhere disputed by the boys, who were joined by the
army of the sâlihâr of Khurshedd; and many Albanians
deserted from his ranks. To replenish his empty coffers he
was also compelled to levy exactations, principally from the
Copts. An attempt was made to ennare certain of the
boys, who were encamped north of the metropolis. On
the 17th of August 1805, the dam of the canal of Cairo
was to be cut, and some chiefs of Mehemet Ali's party
wrote, informing them that he would go forth early on that
morning with most of his troops to witness the ceremony,
inviting them to enter and seize the city, and to pay them,
stipulating for a certain sum of money as a reward.
The dam, however, was cut early in the preceding
night, without any ceremony. On the following morning,
these boys, with their memlooks, a very numerous body,
_break open the gate of the suburb El-Hoseyneeyeh, and
gained admittance into the city from the north, through
the gate called Bâb el-Futuoh. They marched along the
principal street for some distance, with kettle-drums behind
each company, and were received with apparent joy by the
citizens. At the mosque called the Ashrafieeyeh they
separated, one party proceeding to the Azhar and the
houses of certain sheyks, and the other turning to the
south, and through the gate called Bâb Zuwleyeh, where
they turned up towards the citadel. Here they were fired on by some soldiers from the houses; and with
this signal a terrible massacre commenced. Falling back
towards their companions, they found the by-streets closed;
and in that part of the main thoroughfare called Beyn-el-
Kasreyn, they were suddenly placed between two fires.
Thus shut up in a narrow street, some sought refuge in the
 collegiate mosque El-Barkookeyeh, while the remainder
fought their way through their enemies, and escaped over
the city-wall with the loss of their horses. Two memlooks
were slain in the meantime succeeded, by great exertions,
in giving the alarm to their comrades in the quarter of the
Azhar, who escaped by the eastern gate called Bâb el-
Churayeb. A horrible fate awaited those who had shut themselves up in the Barkookeyeh. Having begged for quarter and surrendered, they were immediately stripped nearly naked, and about fifty were slaughtered on the spot; and about the same number were dragged away, with every brutal aggravation of their pitiful condition, to Mehemet Ali. Among them were four boys, one of whom, driven to madness by Mehemet Ali's mockery, asked for a drink of water; his hands were untied that he might take the bottle, but he snatched a dagger from one of the soldiers and rushed at the pasha, and fell covered with wounds. The wretched captives were then chained and left in the court of the pasha's house; and on the following morning the heads of their comrades who had perished the day before were skinned and stuffed with straw before their eyes. One boy and two others paid their ransom and were released; the rest, without exception, were tortured and put to death in the course of the ensuing night.

Eighty-three heads (many of them of Frenchmen and Albanians) were stuffed and sent to Constantinople, with a boast that the Mameluk chiefs were utterly destroyed. This was the first massacre of his too confiding enemies.

The boys, after this, appear to have despaired of regaining their ascendancy, most of them retreated to Upper Egypt, and an attempt at compromise failed. El-Efie offered his submission on the condition of the cession of the Faiyum and other provinces; but this was refused, and that chief gained two successive victories over the pasha's troops, many of whom deserted to him.

At length, in consequence of the remonstrances of the English, and a promise made by El-Efie of 1500 purses, the Pasha consented to reinstate the twenty-four boys, and to place El-Efie at their head; but this measure met with the opposition of Mehemet Ali and the determined resistance of the majority of the Mamelooks, who, rather than have El-Efie at their head, preferred their present condition, for the enmity of El-Bardeesee had not subsided, and he commanded the voice of most of the other boys. In pursuance of the above plan, a squadron under Sahih Pasha, shortly before appointed high admiral, arrived at Alexandria on the 1st of July 1806, with 3000 regular troops, and a successor to Mehemet Ali, who was to receive the pashalik of Salonika. Thus wise chief professed his willingness to obey the commands of the Porte, but stated that his troops, to whom he owed a vast sum of money, opposed his departure.

He induced the 'Ulema to sign a letter, praying the sultan to revoke the command for reinstating the boys, because the chiefs of the Albanian troops to swear allegiance to him, and sent 2000 purses contributed by them to Constantinople. El-Efie was at that time besieging Demenoor, and he gained a signal victory over the pasha's troops; but the dissentions of the boys destroyed their last chance of a return to power. El-Efie and his partisans were unable to pay the sum promised to the Porte; Sahih Pasha received plenipotentiary powers from Constantinople, in consequence of the letter from the 'Ulema; and, on the condition of Mehemet Ali's paying 4000 purses to the Porte, it was decided that he should continue in his post, and the reinstatement of the boys was abandoned.

Fortune continued to favour the pasha. In the following month, El-Bardeessee died, aged forty-eight years; and soon after, a scarcity of provisions excited the troops of El-Efie to revolt. That boy very reluctantly raised the siege of Demenoor, being in daily expectation of the arrival of an English army; and at the village of Shubra-mem he was attacked by a sudden illness, and died on the 30th of January 1807, at the age of fifty-five. Thus was the pasha relieved of his two most formidable enemies; and shortly after he defeated Shabbeen Bey, with the loss to the latter of his artillery and baggage and 300 men killed or taken prisoners.

On the 17th of March 1807, a British fleet appeared off Alexandria, having on board nearly 5000 troops, under the command of General Fraser, and the place, being disaffected towards Mehemet Ali, opened its gates to them. Here Mehemet Ali first heard of the Envoy of El-Efie, upon whose co-operation they had founded their chief hopes of success, and they immediately despatched messengers to his successor and to the other boys inviting them to Alexandria. The British resident, Major Mesnet, having represented the importance of taking Rosetta and El-Bakhmeeyeh, to secure supplies for Alexandria, General Fraser, with the concurrence of the admiral, Sir John Duckworth, detached the 31st regiment and the Chasseurs Britanniques, under Major-General Wauchope and Brigadier-General Meade, on this service, and these troops encamped Rosetta without encountering any opposition; but as soon as they had dispersed among the narrow streets, the garrison opened a deadly fire on them from the latticed windows and the roofs of the houses. They effected a retreat on Abou-Keer and Alexandria, after a very heavy loss of 185 killed and 262 wounded, General Wauchope and three officers being among the former, and General Meade and seventeen officers among the latter. The heads of the slain were fixed on stakes on each side of the road crossing the Ebbebekleyeh in Cairo.

Mehemet Ali, meanwhile, was conducting an expedition against the boys in Upper Egypt, and he had defeated them near Asyoot, when he heard of the arrival of the British. In great alarm lest the boys should join them, especially as they were far north of his position, he immediately sent messengers to his rivals, promising to comply with all their demands, if they should join in expelling the invaders; and this proposal being agreed to, both armies marched towards Cairo on opposite sides of the river.

To return to the unfortunate British expedition. The possession of Rosetta being deemed indispensable, Brigadier-General Stewart and Colonel Oswald were despatched thither, with 2500 men. For thirteen days a cannonade of the town was continued without effect; and on the 30th of April, news having come in from the advanced guard at El-Hamad of large reinforcements to the besieged, General Stewart was compelled to retreat; and a dragoon was despatched to Major Macleod, commanding at El-Hamad, with orders to fall back. The messenger, however, was unable to penetrate to the spot, and the advanced guard, consisting of a detachment of the 71st, two squadrons of the 78th, one of the 35th, and De Rolles's regiment, with a piquet of dragoons, the whole mustering 753 men, was surrounded, and, after a gallant resistance, the survivors, who had expended all their ammunition, became prisoners of war. General Stewart regained Alexandria with the remainder of his force, having lost, in killed, wounded, and missing, nearly 900 men. Some hundreds of British heads were now exposed on stakes in Cairo, and the prisoners were marched between these mutilated remains of their countrymen.

The boys became divided in their wishes, one party being desirous of co-operating with the British, the other with the pasha. These delays proved ruinous to their cause; and General Fraser, despairing of their assistance, evacuated Alexandria on the 14th of September. From that date to the spring of 1811, the boys from time to time relinquished certain of their demands; the pasha on his part granted them what before had been withheld; the province of the Faiyum, and part of those of El-Geezah and Benes Suywyf, were ceded to Shabbeen; and a great portion of the Suez, on the condition of paying the land-tax, to the others. Many of them took up their abode in
Before the town of Er-Rass; but three months' went further south and exiles were attacked by Ibrahim Mehmet Bay that he thinned, they endeavored to mountain their little power by training some hundreds of blacks; but again, on the approach of Ismail, another son of the pasha of Egypt, sent with an army to subdue Nubia and Sennar, some returned to Egypt and settled in Cairo, while the rest, amounting to about 100 persons, fled in dispersed parties to the countries adjacent to Sennar.

Ibrahim Mehmet Ali, being undisputed master of Egypt, at the reiterated commands of the Porte despatched in 1811 an army of 8000 men, including 2000 horse, under the command of Toosoon Pasha, against the Wahhabees. After a successful advance, this force met with a serious repulse at the pass of Sakhir and Judeiydeh, and retreated to Yembo. In the following year Toosoon, having received reinforcements, again assumed the offensive, and captured Medinah after a prolonged siege. He next took Jiddah and Mecca, defeating the Wahhabees beyond the latter to put to and capturing their general. His arms met with various fortune; but on the whole his forces proved superior to those of the enemy. He led a successful expedition in the Hijaz, and, after concluding a treaty with the Wahhabee chief, 'Abd-Allah, in 1815, he returned to Egypt on hearing of the escape of Napoleon from Elba.

He now confiscated the lands belonging to private individuals, merely allowing them a pension for life, and attempted to introduce the European system of military tactics. A formidable mutiny, however, broke out in the metropolis, the pasha's life was endangered, and he sought refuge by night in the citadel, while the soldiery committed many acts of plunder. The revolt was reduced by presents to the chiefs of the insurgents, and Mehmet Ali very honourably ordered that the sufferers by the late disturbances should receive compensation from the treasury. The project of the "Nizam Gedeed," as the European system is called in Egypt, was, in consequence of this commotion, abandoned for a time.

Soon after Toosoon returned to Egypt, but Mehmet Ali, dissatisfied with the treaty which had been concluded with the Wahhabees, and with the non-fulfilment of certain of its clauses, determined to send another army to Arabia, and to include in it the soldiers who had recently proved unruly. This expedition, under Ibrahim Pasha, left in the autumn of 1816. After several unimportant advantages, Ibrahim sat down before the town of Er-Ras; but three months' exertions proving unavailing, he raised the siege, with the loss of nearly half his army. Notwithstanding, he advanced on the capital, Ed-Dir'eeyeh, by slow but sure steps. The last place before reaching that city offered a brave resistance, and Ibrahim, in revenge, caused all its inhabitants to be put to the sword. He came, including children, the former of whom were spared not from motives of pity. Ed-Dir'eeyeh fell after a five months' siege, in the course of which an explosion destroyed the whole of the besiegers' powder; and had the Wahhabees been aware of the extent of the disaster, few, we may believe, would have escaped to tell the tale. 'Abd-Allah, their chief, was taken, and with his treasurer and secretary was sent to Constanti

A remnant of the Memlooks fled to Nubia, and a tran

E CAIRO, but tranquillity was not secured; several times they met the pasha's forces in battle, and once gained a signal victory. Early in the year 1811, the preparations for the expedition against the Wahhabees in Arabia being complete, all the Memlook boys then in Cairo were invited to the ceremony of investing Mehmet Ali's favourite son, Toosoon, with a pelisse and the command of the army. As on the former occasion, the unfortunate Memlooks fell into the snare. On the 1st of March, Shukran Bey and the other chiefs (one only excepted) repaired with their retinues to the citadel, and were courteously received by the pasha. Having taken coffee, they formed in procession, and, preceded and followed by the pasha's troops, slowly descended the steep and narrow road leading to the great gate of the citadel; but as soon as the Memlooks arrived at the gate it was suddenly closed before them. The last of those who made their exit before the gate was shut were Albanians under Sail Kooch. To these troops their chief now made known the pasha's orders to massacre all the Memlooks within the citadel; therefore, having returned by another way, they gained the summits of the walls and houses that hem in the road in which the Memlooks were incarcerated, and some stationed themselves upon the eminences of the rock through which that road is partly cut. Thus securely placed, they commenced a heavy fire on their defenseless victims; and immediately the troops who closed the procession, and who had the advantage of higher ground, followed their example. Of the betrayed chiefs, many were laid low in a few moments; some, dismounting, and throwing off their outer robes, vainly sought, sword in hand, to return, and escape by some other gate. The few who regained the summit of the citadel experienced the same cruel fate as the rest (for those whom the Albanian soldiers made prisoners met with no mercy from their chiefs or from Mehmet Ali), but it soon became impossible for any to retreat their steps even so far; the road was obstructed by the bleeding bodies of the slain Memlooks, and their richly caparisoned horses, and their grooms. 470 Memlooks entered the citadel; and of these very few, if any, escaped. One of these is said to have been a bey. According to some, he leapt his horse from the ramparts, and slighted unhurt, though the horse was killed by the fall; others say he was prevented from joining his comrades that discovered the treachery while waiting without the gate. He fled and made his way to Syria. This massacre was the signal for an indiscriminate slaughter of the Memlooks throughout Egypt, orders to this effect being transmitted to every governor; and in Cairo itself, the houses of the bey were given over to the soldiery, who slaughtered all their adherents, treated their women in the most shameless manner, and sacked their dwellings. During the two following days, the pasha and his son Toosoon rode about the streets, and endeavoured to stop these atrocious proceedings; but order was not restored until 500 houses had been completely pillaged. In extenuation of this dark blot on Mehmet Ali's character, it has been urged that he scrupled not to defy the Porte. But who can believe, would have escaped to tell the tale. 'Abd-Allah, their chief, was taken, and with his treasurer and secretary was sent to Constantinople, where, in spite of Ibrahim's promise of safety, and of Mehmet Ali's interference in their favour, they were paraded and put to death. At the close of the year 1819, Ibrahim returned to Cairo, having conquered all present opposition in Arabia, but without having broken the spirit of the Wahhabees.
The pasha, since his return from Arabia, had turned his attention to the improvement of the manufactures of Egypt, and engaged very largely in commerce. The results of these attempts are stated in other places, but the important work of digging the new canal of Alexandria, called the Mahmooneyeh, must here be again mentioned. The old canal had long fallen into decay, and the necessity of a safe channel between Alexandria and the Nile was much felt. Such was the object of the canal then excavated, and it has on the whole well answered its purpose; but the sacrifice of life was enormous, and the labour of the unhappy fellahs was forced. Towards the accomplishment of a favourite project, the formation of the Nizam Godeed, a force was ordered to the southern frontier of Egypt, and the conquest of Sennâr was contemplated in order to get rid of the disaffected troops, and to obtain a sufficient number of captives to form the nucleus of the new army. The forces destined for this service were led by Isma'il, then the youngest son of Mehemet Ali; they consisted of between 4000 and 5000 men, Turks and Arabs, and were despatched in the summer of 1820. Nuba at once submitted, and Shâgöeyeh Arabs immediately beyond the province of Dongola were worsted, and Sennâr was reduced without a battle. Mohammad Bey, the defender, with another force of about the same strength, was sent by Mehemet Ali against Kordufan with a like result, but not without a hard-fought engagement. In 1822 Isma'il was, with his retinue, put to death by an Arab chieftain named Nimur; and the defender, a man infamous for his cruelty, assumed the command in those provinces, and exacted terrible retribution from the innocent inhabitants.

In the years 1821 and 1822 Mehemet Ali despatched both ships and men (the latter about 7000 or 8000 Albanians and Turks) to the Morea, Cyprus, and Candia, to aid the Porte in reducing the Greek insurrection; and he continued to take part in that struggle, his fleet being engaged at Navarino, until the English insisted on the evacuation of the Morea in 1828 by Ibrahim Pasha. In 1823 an army of disciplined troops was at length organized. 8000 men (chiefly slaves, from Sennâr and Kordufan) were trained by French officers at Asswân. Of the vast numbers seized in the countries above named, many died on the way; those who were not eligible were, with the women, sold in Cairo, and in the remainder were incorporated many fellahs. Colonel Sêves (Suleyman Pasha), a Frenchman who after wards became a Moslem, superintended their organization, great numbers of the blacks died, but the Egyptians proved very superior. Many thousands were pressed in consequence, and they now constitute the bulk of the army.

In 1823 the new conscripts amounted to 24,000 men, composing six regiments of infantry, each regiment consisting of five battalions of 800 men, and the battalions of eight companies of 100 men.

In 1824 a native rebellion of a religious character broke out in Upper Egypt, headed by one Ahmad, an inhabitant of El-Salîmeyeh, a village situates a few miles above Thebes. He proclaimed himself a prophet, and was soon followed by between 20,000 and 30,000 insurgents, mostly peasants, but some deserters from the Nizâm, for that force was yet in a half-organized state and in part declared for the impostor. The insurrection was crushed by Mehemet Ali, and about one-fourth of Ahmad's followers perished, but he himself escaped and was never after heard of. Few of those unfortunates possessed any other weapon than the long staff (labour) of the Egyptian peasant; still they offered an obstinate resistance, and the combat resembled a massacre. In the same year was once more made on the Wahhabees, who had collected in considerable numbers. The 2d regiment was sent on this service, and it behaved in a very creditable manner.

But the events of the war with the Porte are perhaps the most important of the life of Mehemet Ali. The campaign of 1831 had ostensibly for its object the pacification of 'Abd-Allah, pasha of Acre, the invading force consisted of six regiments of infantry, four of cavalry, four field-pieces, and a greater number of siege-guns, the whole under the command of Ibrahim Pasha, while the fleet, conveying provisions, ammunition, &c., was to accompany the army by sea. The terrible cholera of 1831, however, stayed the expedition when it was on the eve of departing, 5000 of its number died, and it was not until early in October of the same year that it started. Little opposition was encountered on the way to Acre, whether Ibrahim had gone by sea, and that place was invested on the 29th of November. The artillery of the besieged was well served, and an assault in the following February was repulsed, and the cold and rain of a Syrian winter severely tried the Egyptian troops. A second assault in like manner failed, and Ibrahim was called away to repel Osman Pasha, governor of Aleppo. The latter, however, hastily decamped without giving him battle, and Ibrahim, deeming this advantage sufficient, retraced his steps towards Acre. He then pushed the siege with fresh vigour, and stormed the city on the 27th of May, 1400 men fell in the breach, and the garrison was found to be reduced to about 4000 men. The fall of Acre was followed by negotiation. Mehemet Ali evinced a disposition for peace, but demanded the government of Syria, and the Porte, in consequence, denounced him as a traitor. On his part, Ibrahim pushed his successes; Damascus was evacuated at his approach, and the battle of Hums, fought on the 5th of July 1832, decided the superiority of the Egyptian army, and the advantage of disciplined troops over an irregular force, although very disproportionate in numbers. The enemy composed the advanced guard of the Turkish army, 30,000 strong, and the Egyptians numbered only 16,000 men.

After this victory, Ibrahim marched to Hamah, and thence to Aleppo (which had just before closed its gates against the Turkish general-in-chief, Hoseyn Pasha, whose troops became rapidly disorganized), forced the defiles of Beylân, and pursued the fugitive Turks to Adaneh. About the same time an Egyptian squadron had chased the sultans fleet into Constantinople. Diplomacy was, at this point, again resorted to, but without any result, the sultan depended on his fleet to protect the capital, and determined to risk another engagement with the victorious enemy. The charge of this venture was intrusted to Ibrahim Pasha, the grand vizir. In the meantime, Isma'il Pasha had gained the pass of Taurus, and having beaten the Turks at Oulou-Kialakh, he hesitated not to give battle to Rezedd Pasha at the head of about 60,000 men, his own army being less than half that strength, the battle of Kounuyeh, on the plains of Anatolia, proved utterly disastrous to the Porte; in the confusion of the fight, and the darkness of a thick day, the grand vizir was made prisoner, his army routed, and Constantinople was within six marches of the victor, without an army to oppose his passage.

The capital of the Ottoman Empire, in imminent danger by sea and land, was then intrusted to the keeping of its hereditary enemy, as the last resource of the sultan Mahmood, and a Russian fleet and army were sent thither. Negotiations were in consequence opened, and on the 14th of May 1833 a treaty was concluded between Mehemet Ali and the Porte, by which the whole of Syria and the district of Adaneh were ceded to the former, on condition of his paying tribute. With that terminated the war, but not the animosity of the sultan. Ibrahim, by excessive firmness and rigour, speedily restored security and tranquillity to the greater part of Syria; but some years later, the attempt of Mahmood to get the better of his vassal, and the consequent
disaster experienced by his arms at Nezzeb, entailed fresh complications, and the interference of Great Britain ended in the restoration of Syria to the Porte in 1841. Mehemet Ali had placed all his reliance on the co-operation of France, and to its desertion of his cause, and his confidence in its assistance, either moral or material, must be ascribed the unfortunate issue of the war. That the Syrians, in general, preferred, the rule of Mehemet Ali to the tyranny of pashas appointed from Constantinople may be safely ascertained; but we cannot close this account of his possession of that province without animadverting on the horrible cruelties perpetrated by Ibrahim Pasha, or warning our readers not to give credence to the unmeasured praise bestowed by many on the Egyptian troops there engaged. Concealing that they were superior soldiers to the Turks, it must be borne in mind that they were veterans, disciplined and led by the French officers and an able general; their opponents were destitute of any European discipline, badly officered, and discouraged by the disasters in Greece. It has, moreover, been stated on good authority, that Ibrahim owed much of his success to the placing of artillery in the rear of his troops, with orders to fire on them should they show symptoms of wavering.

After the peace of 1841 Mehemet Ali gave up all great political projects, and seated himself in improved, real or imaginary, in Egypt. He continued to prosecute his commercial speculations, and manufacturing, educational, and other schemes. The barrage of the Nile, still incomplete, was commenced by his direction, and in 1847 he visited Constantinople, where he received the rank of vizir. In the year 1848, however, symptoms of insubordination appeared; and after a short space Ibrahim was declared his successor, but died after a brief reign of two months.

Mehomet Ali survived Ibrahim, and died on the 3d of August 1849. Many and conflicting have been the opinions entertained of this remarkable man; for such at least all acknowledge him to have been. His massacre of the Memlouks has been the great point of attack by his enemies; but that, as well as many of his other acts, must be ascribed to his boundless ambition, not to inordinate cruelty, for he proved himself to be averse to unnecessary bloodshed. This has really esteemed European civilization may be doubted; but his intelligent mind could not fail to perceive that therein lay his great strength, and of this he availed himself with consummate ability. To his firm government Egypt is indebted for the profound tranquility which it has long been its good fortune to enjoy. A traveller of any nation or faith may traverse it in its length and breadth with greater safety than almost any other country out of Western Europe; and the display of fanaticism has been rigorously punished. While, however, Egypt has benefited by the establishment of order, the people have suffered most severe excstractions. The confiscation of private lands has been before mentioned; to that arbitrary act must be added the seizure of the lands of the mosques, the imposition of heavy taxation, and a system of merciless impressment. In fact, the condition of the Egyptian feliah has rarely been so wretched as it is at the present day. Mehemet Ali also misunderstood the real resources of Egypt, which are certainly agricultural; he dealt a severe blow to native produce by endeavouring to encourage manufacturing industry, and by establishing enormous Government monopolies, a measure which crushed the spirit of the agriculturists. His military and governing abilities were assuredly very great; his career is almost unequalled in Turkish history. Had it not been for the intervention of Great Britain, his Syrian successes over the Porte would probably have rescued Egypt from the wretched condition of a Turkish province. But the firmán of 1841 entailed the loss of all his military power, the army was reduced to 18,000 men, and the navy condemned to rot in the harbour of Alexandria; while Mehemet Ali, failing to gain the great object of his ambition, the establishment of an independent dynasty, and being compelled to look on his then living family as his only heirs, thenceforth confined himself to measures of loss improvement, and did not prosecute even those with his former energy.

The entire constitution of the government of Egypt is the work of Mehemet Ali. With a few exceptions, he destroyed all former usages, and introduced a system partly derived from European models. The army and navy are of his creation, so are the taxation, the regulation of import and export duties, &c., quarantine laws, the manufacturers, colleges, and the ministry. Some of these institutions are useful, others both vexatious and ill-calculated for the country. The colleges of languages and medicine, and the printing-press at Boulak, are among the former, and are exceedingly praiseworthy in a right direction; and in the same category must be placed many minor improvements, in which Mehemet Ali showed himself to be far in advance of his countrymen; while, weighing his chequered life and numerous disadvantages of position and nation, his prudent character, enlightened mind, and distinguished ability must place him high among the great men of modern times.

Ibrahim was succeeded by his nephew 'Abd Allah, son of Tawfik. This miserable voluptuary, and wilful bigoted though ignorant Mussulman, utterly neglected the affairs of government and solely consulted his own gratification. During his reign all the great works begun by Mehemet Ali were suspended. It was a time of deliberate retrogression, and his sudden death in July 1854 was welcomed by all true Egyptians as the removal of the country's curse. His successor, Said Pasha, the fourth son of Mehemet Ali, endeavoured to pursue his great father's policy and to carry out his aims. He had not, however, the strength of character or the health needed to meet the serious difficulties of the task, and he will chiefly be remembered for the abolition of some of the more grinding Government monopolies, and for the concession of the Suez Canal. It was reserved for his nephew, the present khedive, to attain all and more than that Mehemet Ali had designed for his country.

The reign of Ismail promises to be the beginning of a new era for Egypt. A man of undoubted ability, possessed of unusual energy in administration, fully appreciative of the importance of Western civilization, fired with the ambition proper to a grandson of Mehemet Ali, the khedive is a ruler such as Egypt has scarcely seen since the Arab conquest. His first step was to remove, as far as possible, the irksome control of the Porte. At great cost he obtained an imperial firmán in 1866, removing almost all the old treaty restrictions, granting him the title of khedive.  

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1 The Dynasty of Mehemet Ali.  
I. Mehemet Ali, d. 1849.  
II. Ibrahim, Ismail, Tawfik, Mustafa.  
III. 'Abd Allah, Tawfik, Ismail, d. 1854.  
IV. Said.  
V. Muhammed, d. 1876.  
Ahmad, d. 1858.  
Mustafa, d. 1875.  
Ibrahim, d. 1849.  
Mehomet Tawfik.  
Ismail, d. 1868.  
Hoseyn, Halim, Mehemet Ali.  
Hoseyn, Hassan. 8 other children.
Having thus obtained for himself and his dynasty a settled regal rank, Ismail turned his attention homewards, and began a series of reforms such as no previous governor of Egypt ever contemplated. He re-established and improved the administrative system organized by Mehemet Ali, and which had fallen into decay under 'Abdah's indolent rule; he caused a thorough remodeling of the customs system, which was in an anarchic state, to be made by English officials; in 1865 he bought the Egyptian post-office, and placed it under the direction, with full powers, of an official from St. Martin's Land, who has brought it into admirable working order; he reorganized the military schools of his grandfather, and lent his willing support to the cause of education in every way. Public works have largely engaged the attention of the khedive. Railways, telegraphs, lighthouses, the harbour works at Suze, the breakwater at Alexandria, have been carried out under his personal auspices by some of the best contractors of Europe. If there is a fault to be found in this Europeanizing of Egypt, it is that the practical zeal for modern civilization leaves no room for the honourable respect due to the unique antiquities of the country. It is true that ancient Egypt is protected by the care of Mariette Bey, but the art of the Arabs is suffered to decay, may, as is even purposely demolished, to make room for modern French gewgaws. A recent writer tells us that a new street cuts through about a mile of the "old Arab rookeries," and gravely advances the opinion that the opera house and the public gardens and the other meretricious abominations that have been set up in Cairo are worthy of a second-class European city! Still, terrible as is the vandalism now going on in Egypt, there can be little doubt that the present policy of the khedive will add greatly to the prosperity and health of the people. At the same time, future generations will gain at the fearful expense of the present. The funds required for these public works, as well as the actual labour, have been remorselessly extorted from a poverty-stricken population; and there is probably no peasant now existing whose condition is worse than that of the long-suffering Egyptian fellah.

One of the greatest reforms that Egypt owes to its present ruler is the abolition of the old system of consular jurisdiction, and the substitution of mixed courts, where European and native judges sit together to try all mixed cases without respect to nationality. These courts were established in 1874 on the suggestion of the wisest of Egypt's statesmen, Nubar Pasha, and on the recommendation of an international commission. A code based on the Moham­medan law and the Code Napoleon has been drawn up, which seems thoroughly suited to the needs of the position; and the best results may be looked for from this reform. It was greatly to be desired that the jurisdiction of those courts should be extended so as eventually to supersede the old native system. At present they only take the place of the consular courts.

In recent times the khedive has annexed a large territory to the south of Kharthoum, now extending about as far as Goudokoro, and which will doubtless shortly include the lakes of Victoria and Albert Nyanza. The expedition was at first commanded by Sir Samuel Baker, with very unsatisfactory results; and great relief was felt when the continuance of the war of conquest was intrusted to Colonel Gordon, an officer in whose character and ability the fullest confidence is placed. The khedive has professed himself anxious to put down the Nile slave-trade, and that he is really desirous of seeing the traffic ended is shown by the full powers he has given Colonel Gordon for the suppression of it in the heart of the slave-country. What the result will be it is hard to foretell; but the good faith of the khedive and the determination of Colonel Gordon are now beyond a doubt. Quite recently (Aug. 14, 1877) a convention between the British and Egyptian Governments for the suppression of the slave-trade has been signed, imposing stringent penalties on the importation of slaves into Egypt, and extending the power of search in the case of suspected vessels.

Altogether it may be believed that a better time is beginning for Egypt. (E.B.—S.L.P.)

TOPOGRAPHY AND MONUMENTS 1

The northern coast of Egypt is low and barren, presenting no features of interest, and affording no indication of the character of the country which it bounds. It is a barrier, generally of sand-hills, but sometimes of rock, for the most part wholly destitute of vegetation, except where grow a few wild and stunted date-palms. Immediately behind are desolate marshy tracts or extensive salt lakes, and beyond, the fertile country. The last is a wide plain, intersected by the two branches of the Nile, and by many canals, of which some were anciently branches of the river, and having a soil of great richness, though in this particular it is excelled by the valley above. The only inequalities of the surface are the mounds of ancient towns, and these, often if not always ancient, on which stand the modern towns and villages. The palm-trees are less numerous, and not so beautiful as in the more southern part of the country, but other trees are more common. The houses and huts of the towns and villages are of burnt brick near the Mediterranean; but as the climate becomes drier, and the occurrence of rain far less frequent, the use of crude brick obtains, until near the point of the Delta it is very general. The mosques even of the towns are rarely remarkable for architectural beauty in the tract to the north of Cairo. The palaces or villas of the Turkish grandees, which are not uncommon, have, however, a light and picturesque appearance, though their style is not good. The deserts which inclose the plain on both sides are rocky tracts of very slight elevation, having their surface overspread with sand and other debris.

Of the towns on the northern coast, the most western, Alexandria, called by the natives El-Fakendoroeyeh, is the largest and the most important. It was founded in the year B.C. 332 by Alexander the Great, who gave it the form of a Macedonian network, and by many moderns it is considered that country.

The island of Pharos was likewise inhabited, and was joined to the continent by the mole called the Heptastadium. The Heptastadium and the island divided the bay into two harbours. These were spacious, and although the western, anciently called Portus Eunocci, but now the Old Port, is difficult to enter, and the eastern, Magnus Portus, or the New Port, is not so deep and is less secure, they are, except for Said, by far the best anchorage on this coast of Egypt.

Alexandria, which partly occupied the site of the ancient Rhacotis, a place of little importance, naturally speedily increased in consequence, and became the emporium of the trade between Europe, Arabia, and India. After the death of Alexander the city became the capital of the Ptolemies. By the Ptolemies Alexandria was adorned with palaces and

1 The following account of the topography and monuments of Egypt is mainly based on Mr. Lane's MS. "Description of Egypt," which the writer of this article used as his guide to the monuments during his residence in that country.
of great magnificence, for which they did not scruple to
despoil more ancient edifices of some of their choicest orna-
ments. While its commercial importance increased, it
became a celebrated seat of learning, with the greatest
library of antiquity, through the wise interest with which
the Greek kings regarded science and letters. Under the
Ptolemies, however, the inhabitants, who were chiefly
Greeks, became very troublesome to their rulers, like most
commercial populations, and their turbulence was ill
restrained by the weakness of the later sovereigns of that
line. From the time of the Roman conquest, B.C. 30, until
it was taken by the Arabs, A.D. 641, Alexandria sensibly
declined, partly in consequence of its being a provincial
capital, instead of a royal residence, but chiefly because of
the unvarying disposition of its inhabitants, and their violent
religious and political disputes, which at last resulted in
the seat of government being transferred to the fortress of
Egyptian Babylon, near the modern Cairo, which became
in some sort the capital. During this period it had been
distinguished for the learning of its ecclesiastics, and the
strong part which they took in the theological disputes
of the early church. Under the Muslims Alexandria never
regained the position of metropolis of Egypt, and its
importance, with some fluctuations, waned until the dis-
cover and consequent adoption of the route to India by
the Cape of Good Hope almost withdrew the main cause
of its prosperity. Recently, however, the resumption of
the overland route has greatly benefited this city, and
although it was not made the capital, it became the favourite
residence of Mehemet Ali, which in like manner contributed
to its welfare.

The older part of the town of Alexandria stands upon the
Heptastadium, now much wider than it was anciently; but
the recent part, where are the houses of the European mer-
chants, occupies the site of a portion of the ancient city,
which was nearest to the mole. The most striking edifice is
the castle on the island of Pharos, containing a lighthouse,
which has succeeded to the more famous Pharos of antiquity.
Here also is the pasha's palace, as well as a lesser Pharos.
The houses of the town are built of stone, or have their
lowest story cased with that material, and the portion
above built of brick plastered and whitewashed. The
residences of the European merchants and consuls and
the houses of Turks and natives are spacious and well-buil-
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To the east of Alexandria, the first place of
importance is El-Rashed, called by the Europeans Rosetta,
a considerable town on the west bank of the Rosetta branch
of the Nile, anciently the Bobstine. Before the cutting
of the Moehemel All of the Mahnemohon Canal to connect
Alexandria with this branch of the river, Rosetta was a
place of greater importance than now, as in consequence of
the decay of the old canal of Alexandria, the overland trade
from India chiefly passed through it. It is a well-built
town, having some gardens, and is in many respects
more agreeable than Alexandria. Its population is stated
to be 15,000. A little to the north of the town is the
bogház, a bar of sand stretching across the mouth of
the river, and rendering it often impassable; and between
it and Rosetta is an old fort called Fort St Julian by the
French, who repaired it during their occupation of Egypt,
when one of their officers discovered the Rosetta Stone,
the famous trilingual tablet which afforded the clue by
which hieroglyphics were interpreted.

In ascending the Rosetta branch, the first place of
interest is the site of Sais, satis, on the eastern bank, marked
by lofty mounds, and the remains of massive walls of crude
brick, in one of which are those of a great enormous pillar,
the chief temple and doubtless other sacred edifices stood.
The goddess Nit or Neith was the divinity of the place, and a
great festival was annually held here in her honour, to
which pilgrims resorted from other parts of Egypt. Sais
was remarkable for the learning of its priests, and was the
royal residence of the Saite kings (Dynasties XXIV., XXV.)
A modern village here is called “Sâ-el-Hagar,” or “Sâs of the
Stone,” a name which perhaps alludes to the famous
monolith described by Herodotus.

In the interior of the modern Delta no remains of import-
ance have been discovered, though there are many ancient
sites marked by mounds. The chief towns are El-Mahalla
el-Kebeereh, not far from the Damietta branch, about forty
miles from the sea; Tantâ, nearly in the middle of the
Delta; and Manoof, farther south. Of these Tantâ is best
known as the birth-place of a Muslim saint, the seyiyd
Ahmad El-Bedawee, in whose honour three festivals are
annually kept, the greatest of which attracts more
pilgrims than any other in Egypt, and is in this respect second
alone to the pilgrimage to Mecca. The festivals of Tantâ
are rather distinguished by riot than piety, and recall the
revelries of Bubastis and Canopus.

Several places of interest are found on the course of the
Damietta branch, the old Phatnatic or Pathmetic. First
of these is the town whence

Thothmes III., Ramses II., and a later king. Beside it
rule. Pompey's

Greeks, being nearly

obelisks

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of granite, and its shaft is about 70 feet high, the whole
column being nearly 100 feet in height. Its pedestal bears a
Greek inscription in honour of the emperor Diocletian.

Proceeding to the east of Alexandria, the first place of
importance is El-Rashed, called by the Europeans Rosetta,
from Syene, a distance by the river, on which they were doubtless floated, of more than 600 miles. Bearing in mind this circumstance, and the difficulty of both working and sculpturing so hard a material, this temple must be considered to be one of the most costly in the country. The earliest name which has been found here is that of Nekht-har-heap (Dynasty XXXX.), but the most common one is that of Potomry Philadelphus. A little to the south of this site, on the same bank, is the small town of Semnnon, anciently Sobennytus, and a short distance farther, on the same side, is the village of Aboo-Seer, the ancient Busara named after Oasirs, who, with Iss, was here worshipped. Herodotus mentions among the great festivals that of Iss he held at Busara, but this was more probably kept at Iseum, which was not far. For a long distance there is nothing of interest until we reach Tel-Atreeb, where the site of the town of Athribus is marked by high mounds, with remains of ancient houses and some blocks of stone.

To the eastward of the Dammitra branch, in the broad cultivated tract or the desert beyond, are some places worthy of note. The most eastern of these is the site of Pelusium, which was, in the times of the Pharaohs of Dynasty XXVI., the key of Egypt towards Palestine. No important remains have been discovered here. Between this site and the Dammitra branch are the mounds of Tuna, or Zoon, ZAN, ZAB, where are considerable remains of the great temple, the most remarkable of which are several fallen obelisks, some of which are broken. From their inscriptions and those of other blocks, it has been ascertained that the temple was as ancient as the time of Dynasty XII., and was much beautified by Ramses II. and other kings of that time and the subsequent period. Tuna was on the eastern bank of the Tanite branch of the Nile, now called the Canal of El-Mo'izz. On the same side of the same branch, but far to the south, was the city of Bubastis, PE-BAST, the site of which is indicated by very lofty mounds, in which may be traced the remains of its great temple, which was entirely of red granite. Here was held the festival of the goddess Bast, or Bubastis, which attracted great crowds of pilgrims, and is ranked by Herodotus first of the festivals of Egypt. Not far south, and on the borders of the desert, is Bilbeys, which was a place of some importance as a frontier-town in the time of the Eyoyoee princes. Still farther south are the mounds of Omron, the Jewish city founded by the high priest Onas, which was a temple closed by Vespasian not long after the overthrow of Jerusalem. The site is called Tell-al-Yahoodieyeh, or "The Mound of the Jewess."

At the point of the Delta is the unfinished barrage, which, by crossing both branches of the river, will regulate the inundation above and below this point. The river here becomes broader than in its divided state, and long continues so. A little south of the point of the Delta, on the eastern bank of the river, near the village of El-Matarieyeh, not far north of Cairo, is the site of the ancient Helopolis, or On, AN, the City of the Sun, marked by a solitary obelisk, and eruda brick rucles formed by the ruins of a massive wall. The obelisk bears the name of Userteran, the second king of Dynasty XII., in the simple inscription which runs down each of its sides. It is of red granite, and nearly 70 feet in height. The city was famous rather for the learning of its colleges than for its size, and the temple of the sun was held in high veneration. Many famous Greek philosophers studied here, and much of their earliest knowledge of natural science was no doubt derived from their Egyptian instructors.

Boolak, the port of Cairo, is a flourishing town, having two remarkable mosques. It was built A.H. 713, in the reign of the sultan Mohammed Ibn Kal'a-un. Here M. Mariette has founded the national "Musée Boulaq," a splendid collection of Egyptian antiquities.

Cairo is the fourth Muslim capital of Egypt, the site of one of those that have preceded it, for the most part, included within its walls, while the other two were a little to the south. 'Amr, the Muslim conqueror of the country, founded El-Fustat, the oldest of these, close to the fortress of Egyptian Babylon, the seat of government at that time. Its name signifies "The Tent," as it was built where 'Amr had pitched his tent. The new town quickly became a place of importance, and was the residence of the Nahiya, or levies, appointed by the orthodox and Ommade caliphs. It received the name of Masr, properly Miur, which was also applied by the Arabs to Memphis and to Cairo. It declined after the foundation of El-Kahireh, but never became altogether deserted, for a small town, called Masr El-Ateekah, or "Old Masr," occupies, in the present day, part of what was its area in time of prosperity. Shortly after the overthrow of the Ommade Dynasty, and the establishment of the 'Abbasides, the city of El-'Askar was founded (A.H. 133) by Sulayman, the general who subdued the country, and became the capital and the residence of the successive levies of the 'Abbasid caliphs. El-'Askar was a small town adjacent to El-Fustat, of which it was a kind of suburb. Its site is now entirely desolate. The third capital, El-Kutbat, or El-Khatib, was founded about A.H. 269, by Ahmad Ibn-Tooloon, as his capital. It continued the royal residence of his successors, but not long after the fall of the dynasty, and the subsequent Khilafahs, the seat of government was transferred by the Fatimides to a new city, El-Kal'ah, which had been sacked on the overthrow of the Tooloons, rapidly decayed. A part of the present Cairo occupies its site, and contains its great mosque, that of Ahmad Ibn-Tooloon.

Gohar El-Kaud, the conqueror of Egypt for the Fatimides caliph El-Mo'izz, founded a new capital, A.H. 385, which was named El-Kahireh, that is, "the Victorious," a name corrupted into Cairo. This town occupied about a fourth part, the north-eastern, of the present metropolis. By degrees it became greater than El-Fustat, and took from it the name of Masr, or Miur, which was applied to it by the modern Egyptians. It continually increased, so as to include the site of El-Katayeh, but not long after the fall of the dynasty, and the subsequent Khilafahs, the seat of government was transferred by the Fatimides to a new city, El-Kal'ah, which had been sacked on the overthrow of the Tooloons, rapidly decayed. A part of the present Cairo occupies its site, and contains its great mosque, that of Ahmad Ibn-Tooloon.

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tion.) Sir Gardner Wilkinson, in his Modern Egypt and Thebes (t. 256), published in 1845, gives the population at about 290,000; and Mrs Poole, writing in 1842, estimates it at about 240,000 (Englishwoman in Egypt, i. 136); but Clot-Bey (Aperçu Général, i. 204), whose work appeared in 1840, states the much higher amount of about 300,000 souls. The census of 1847–8 states the more moderate number of 293,841 inhabitants, and the rest, strangers from various countries. The adult male population was about one-third of the whole, or 80,000 persons, of whom 30,000 were merchants, petty shopkeepers, and artisans, 20,000 domestic servants, and 15,000 common labourers, porters, &c.; the remainder chiefly consisting of military and civil servants of the Government. (Modern Egyptians, l. c.)

Of the most remarkable in conventionalized foliage. Like its contemporary Gothic, it has three great periods, those of growth, maturity, and decline. Of the first, the mosque of Ahmad Ibn-Tooloon in the southern part of Cairo, and the three great gates of El-Kahirah (the old city), the Bab-en-Nasr, Bab-el-Futooh, and Bab-Zuweyleh, are splendid examples. The leading forms are simple and massive, with in the mosque horse-shoe arches. The decoration is in fountains, and its details of conventionalized foliage. The second period passes from the highest point to which this art attained to a luxuriance promising decay. The mosque of Sultan Hassan, below the Citadel, those of Mueiyad and Kalâ-oon, with the Barkookeyeh, in the main street of the old city, and the mosque of Barkook in the Cemetery of Kâit Bey, are instances of the earlier and best style of this period. The forms, though still massive, are less simple, and they are admirably adapted to the necessities of space. The decoration is in conventionalized foliage, the most free forms, balanced by exquisite geometrical patterns. Of the last style of this period, the Ghoooreeyeh, in the main street of the old city, and the mosque of Kâit Bey in his cemetery, are beautiful specimens. They show an elongation of forms and an excess of decoration in which the florid qualities predominate. Of the age of decline the finest monument is the mosque of Mohammad Bey Abou-Dubab, in the old city. The forms are now poor, though not lacking to grandeur, and the details are not as well adjusted as before, with a want of mastery of the most suitable decoration. The usual plan of a congregational mosque is a large, square, open court, surrounded by colonnades, of which the chief, often with more rows of columns, faces Mecca (eastward), and has inside its outer wall a decorated niche to mark the direction of prayer. In the centre is a fountain for ablutions, often surmounted by a dome, and in the eastern colonnade a pulpit and a desk for readers. When a mosque is also the founder's tomb, it has a richly ornamented sepulchral chamber. Of domestic architecture there are a few precious fragments before the age of decline; but most specimens are of the latest period of that age. These are marked by a singular fitness and great elegance in the interiors. The decoration, though inferior to that of the mosques of the best style, is charming for variety and beauty of pattern. See Cairo, and also Architecture, vol. ii, pp. 445–44.

To the east of Cairo is a bold spur of the mountains known as El-Gebez El-Mukattam. Beneath it, and to the north of the Citadel, is the Cemetery of Kâit Bey, remarkable for the splendid tombs of the Memlooks sultans. The most beautiful of these is that of Kâit Bey, from which the cemetery takes its name, but those of the sultan Barkook and of El-Ghooreeyeh must not be passed by unmentioned. At a little distance to the north-east is the Gebel-el-Ahmar, or "Red Mountain," and southward of this, petrified wood in large quantities is seen strewn on the surface of the desert. The space between Cairo and the Nile, varying from a mile to a mile and a half in breadth, is occupied by plantations which were made by Ibrahim Pasha, during his father's rule. Formerly this side of the city was, as the other three are still partially, bounded by lofty mounds of rubbish, these he caused to be removed, and by dong so conferred a great benefit upon the inhabitants, as well as by planting with trees the intervening space. By irrigating this tract very freely with a steam-engine he considerably lessened the good he had effected, rendering the western part of the city somewhat damp. To the south of Cairo is a great cemetery containing the tomb of the Imam Esh-Shafe'ee, and also an aqueduct, built by the sultan El-Ghooreeyeh, which conducts water from the Nile to the Citadel; and further south, the Roman fortress of Egyptian Babylon, now called Kaa-es-Sheem, at present chiefly occupied by a Coptic convent, as well as the small town of Mar El-Ateekah, which is all that remains of the famous metropolis El-Fustât. It contains no remarkable edifices: in its immediate neighbourhood, however, is the oldest mosque in Egypt, that of 'Amr, the Muslim conqueror, but it has been so frequently repaired and almost rebuilt that it is impossible to form any idea of its original appearance. Opposite to Mar El-Ateekah, from which it is separated by a very narrow branch of the Nile, is the island of Er-Rodâh, containing the famous Mîkûya, or Nilometer.

The chief place on the western bank near Cairo is the small town of El-Gebez, opposite Mar El-Ateekah. El-Gebez is best known as having given its name to the most famous group of Pyramids, the chief monuments of Memphis, which stand on the slightly elevated border of the low Libyan range, not more than a quarter of a mile beyond the limit of the cultivated land.

The city of Memphis, seen, "the good station," stood on the western bank of the Nile about ten miles above Cairo. It was founded by Memnon, the first king of Egypt. The kings and people who dwelt there chose the nearest part of the desert as their burial-place, and built tombs on its rocky edge, or excavated them in its sides. The kings raised pyramids around which their subjects were buried in comparatively small sepulchres. The pyramids were grouped together, and often there is a long distance from one group to another. Although many pyramids have been nearly or wholly destroyed, yet, as the largest undoub-
PYRAMIDES

EDGY

Like wise small ones, were tombs of kings. Each had its name and extended, if we measure from the ruined Pyramid of Abou-Haweyah, somewhat to the north of those of El-Geesheh, to the southernmost Pyramid of Dahaboor, throughout a space of nearly twenty miles, in almost every part of which some sepulchres have been discovered, while it cannot be doubted that many more await a fortunate explorer.

The road to the pyramids of El-Geesheh from the town is through cultivated fields diversified by villages in palm-groves. As we approach them, these structures do not give us that idea of size that we had expected from our first distant view; and until we stand at their feet we do not appreciate their vastness. But as we endeavour to scan the height of the Great Pyramid, when about to begin its ascent, we fully realize a result that human labour has not achieved elsewhere. The very dimensions (a height of about half a thousand feet, four sides each measuring the square of a mile) set in themselves gigantism; but when we know that this huge space is almost solid, containing a few chambers so small as not to be worthy of consideration in calculating its contents, we discover that no monuments of man's raising elsewhere afford any scale by which to estimate its greatness. The Pyramids, except one or more small ones, were tombs of kings. Each had its name and a priest attached to it, for whose functions there was a chapel at some distance in front of the entrance.

The Great Pyramid, "the Splendid," was the mausoleum of Khufu, or Cheops, of Dynasty IV. The present perpendicular height of the structure is, according to General Vyse, 450 feet 9 inches, and the side of its present base 746 feet. It is about 30 feet lower than it was originally, in consequence of the casing stones and much of the outer masonry having been torn off; and its base is likewise smaller. General Vyse gives the former height at 480 feet 9 inches, and the side of the former base at 764 feet. Like all the other pyramids, it faces the cardinal points. At the completion of the pyramid the faces were smooth and polished, but now they present a series of great steps formed by the courses of stone, and are in some places (particularly in the middle of each facet, and at the angles, and about the entrance) much broken. The ascent is easy though fatiguing, and the traveller is amply rewarded by the view which he obtains from the platform, about 33 feet square, at the summit. The prospect of the fertile plain and valley on the one side, and of the undulating barren surface of the Great Desert on the other, as well as of the pyramids and tombs beneath, is alike remarkable from its character and the associations which it calls up. The examination of the interior is no less interesting. All our information about the Memphis pyramids, and those which were simply pits, were not closed, the upper chamber being intended for the performance of funeral rites when the family of the deceased visited his sepulchre. These pyramids, however, were most carefully closed. The chambers, which contained the bodies of the king, and of those (doubtless of his family) who were sometimes buried in the same structure, are without sculpture, and scarcely ornamented in any way, being usually wholly plain. The passages leading to them are only large enough to admit a sarcophagus, and after the king's burial were closed by the lowering of heavy stone portcullises, and the blocking up of the entrance. The desired object was security, and we must not, therefore, expect beauty or grandeur in chambers constructed for this purpose, although we cannot fail to admire their massive and gloomy aspect.

The entrance of the Great Pyramid is not far from the middle of the northern face, 49 feet in perpendicular height from the base. The fallen stones and rubbish have, however, raised a mound which reaches near the entrance, the masonry about which having been torn down, we gain some idea of the construction of the pyramid. In this manner the passage has lost somewhat of its length. The passage itself is 3 feet 11 inches high, and 3 feet 6 inches wide, and is lined with fine limestones at an angle of 26° 41'. At a distance of 63 feet 3 inches from the beginning of the roof of the present entrance, a second passage commences from this, taking an ascending direction. The entrance of this new passage is obstructed by great blocks of granite which entirely fill it, and have been passed by means of an excavation around them. We thus enter the ascending passage, which is of the same breadth and height as the former, and inclines at an angle of 26° 18'. The stones which line its roof and sides are very rough, and it has evidently been left unfinished.

After ascending this passage for a distance of 109 feet 7 inches, we reach the Grand Passage, which, from its greater dimensions, presents a comparatively imposing appearance. It ascends at the same angle as the last, whose horizontal passage runs beneath it to a chamber to be subsequently mentioned. Just within the Grand Passage is the mouth of the Well, an irregular pit, partly excavated in the rock, leading to the lower portion of the first passage. Its object was probably to afford an exit to those men who had been engaged in closing the ascending passage. The Grand Passage is 6 feet 10 inches in width at its base, 28 feet high, and 156 feet long. The blocks which compose its sides gradually approach, every course above the second projecting a little; at the mouth of the passage a horizontal one begins, of much smaller but unequal dimensions, and 22 feet 1 inch in length, leading to the Grand Chamber, commonly called the King's Chamber, which it enters at the eastern end of its north side. This chamber, which is the principal sepulchral chamber (unless, indeed, there be an undiscovered one of greater importance), is lined with red granite, and measures in length 34 feet 5 inches, in width 17 feet 1 inch, and in height 19 feet 1 inch. It is altogether plain, and contains only a sarcophagus of red granite, which is equally undecorated. Above this chamber are five small ones, which may be called entrenches, evidently designed to lighten the pressure of the superincumbent masonry, particularly as the uppermost of them has a pointed roof. Four of these were discovered by the late General Howard Vyse, who found in them quarry-marks, bearing, in two varieties, the name of Khufu, the royal builder of the pyramid. These chambers are reached with difficulty, and chiefly by forced passage. The horizontal passage beneath the Grand Passage must now be described. This is but 5 feet 10 inches high, and

3 See Sir John Herschel's Observations on the Entrance Passages in the Pyramids of Gizeh, in Vyse's Pyramids of Gizeh, vol. ii. pp. 107-109. The different angles of the entrance passages of other pyramids, and the circumstance that they were always closed at the completion of the buildings, show that the king's remains were put, at a supposed date of his erection, to a Drascoma, which was then the pole-star, and is not to be regarded as more than accidental. However, as above mentioned, the pyramids face the cardinal points.
3 feet 5½ inches wide, for the first 92 feet of its length, and then we descend a step and find the passage to be 5 feet 8 inches high for 17 feet 11 inches farther, until we enter the "Queen's Chamber," as it is usually called, at the eastern corner of its north side. This chamber is 18 feet 9 inches long, and 17 feet broad, and its extreme height is 20 feet 3 inches. It has a pointed roof, of great blocks of stone, inclined upwards and meeting in the middle. Within it is the entrance of a forced passage. The remainder of the first passage, beyond where the first ascending passage leads to the most interesting parts of the structure, is still to be noticed. It continues below the forced entrance to the ascending passage for a distance of 236 feet 10 inches, being cut through the rock on which the pyramid is built. For this space its inclination and proportions do not change, but it then becomes horizontal for 27 feet, terminating at the entrance of an excavated chamber 46 feet in length, and 27 feet 1 inch in breadth, but of irregular and inconsiderable height. There is no doubt that this chamber was left unfinished at the closing of the pyramid. Beyond it the passage continues, opposite to where it entered the chamber, and extends horizontally 52 feet 9 inches into the rock in the same direction.

The Second Pyramid, which bore the name of "the Great," is what the tomb of Menkaura (Dynasty IV.), stands at a short distance to the south-west of the Great Pyramid, which does not very much exceed it in magnitude, though far superior in its construction. It has a base of 690 feet 9 inches square, and 447 feet 6 inches in height, being more steep than its larger neighbour. A great part of its casing having been preserved, extending about a fourth of the distance from the summit, the ascent is very difficult, especially as when one has climbed on to the casing portion he can see nothing of the lower part of the building, and thus feels as if upon a pyramid in the air. There are two entrances, both in the north side, from which, and other peculiarities, it is possible that the building was originally much smaller than now, and that, after its first completion, it was enlarged, and a new entrance and sepulchral chamber added.

The Third Pyramid, "the Superior," the tomb of Menkaure, or Mycerinus, is almost in a line with the other two, and of much smaller dimensions, being only 203 feet in height, and 354 feet 6 inches square at the base. It is constructed beautifully, and in a costly manner, and in these respects is unequaled, if equalled, by any other pyramid. The exterior was anciently cased altogether, or covered with a granite, but this has been generally torn off. General Vyse opened it, and found that it had been previously ransacked. In it he discovered a very beautiful sarcophagus (which was unfortunately lost at sea on its way to England), as well as part of a mummy-case, bearing the name of King Menkaure, and a mummy, not certainly the king's, both of which are now in the British Museum. This confirms the statement of Herodotus that it was the tomb of Mycerinus. Manetho says that it was built by Queen Nitocris (Dynasty VI.). This apparent incongruity is explained, as Bunsen remarks ("Egypt's Place, ii. 165, sq., 210, sq.), by the construction of the pyramid, which has two principal chambers, and was evidently enlarged after its first completion, so that we may reasonably suppose that it is the sepulchre of both Menkaure and Queen Nitocris.

Near the three large pyramids are six smaller ones; three of these are near the east side of the Great Pyramid, and three on the south side of the Third Pyramid. They are probably the tombs of near relations of the kings who founded the great pyramids. The space around the pyramids is occupied by very numerous tombs, some built of stone, others excavated in the sides of the rock on which the pyramids stand, while others are simply pits with sepulchral chambers leading from them. The most interesting of these occupy a square bounded on the east by the Great Pyramid and on the south by the Second, and are mostly the sepulchres of the subjects of Khufu and other kings of Dynasties IV. and V. These tombs, which are of inconsiderable dimensions in comparison with the others and elsewhere, are all built of stone, and have inclined walls, so as to resemble truncated pyramids. They usually contain a chapel, or more rarely chapels, the walls of which are decorated with most remarkable painted sculptures, portraying the everyday life of the Egyptians at that remote age, with short inscriptions of an explanatory character. The absence of representations of the gods and subjects clearly connected with religion is noteworthy. Other similar tombs stand to the east and south of the Great Pyramid; and in the former direction are the principal sepulchral grooves hewn in the side of the elevated rocky tract on which the pyramids stand. Some of these excavations bear similar representations to those of the other tombs already mentioned. To the east of the Second Pyramid is the Great Sphinx, called in Egyptian "cvsnu," emblem of Hor-em-akhu, "Horus in the horizon," one of the most characteristic monuments of the Sphinx, of an earlier date than the Great Pyramid. It is a recumbent androphophus, or man-headed lion, 188 feet 5½ inches in length, hewn out of a natural eminence in the solid rock, some defects of which are supplied by a partial stone casing, the legs being likewise added. Steps lead down to its front, where are a sanctuary and tablets, but these are covered by the sand, which, after the hollow has been cleared, speedily fills it again. Not far to the westward of the Sphinx is the remarkable enclosure known as Campbell's Tomb, discovered by General Vyse, chiefly consisting of a large pit surrounded by a trench. The causeway leading to the Great Pyramid and to the Third, the former of which greatly excited the admiration of Herodotus, are well worthy of a careful examination. The only pyramid which stands to the north of this group is that of Aboo-Ruweysh, which is in so ruined a condition as scarcely to deserve a visit. It lies about five miles to the north of the Great Pyramid.

Southward of the Pyramids of El-Geezeh, the first objects of interest are those forming the similar group of Aboo-Seer, of much smaller dimensions, the largest being about the size of the Third Pyramid. They are on the elevated edge of the Libyan chain, about seven miles from the Third Pyramid, and are four in number, three being large, and the fourth very small. The Northern Pyramid of Aboo-Seer appears to have been the tomb of Saha of Dynasty V., and the Middle Pyramid is the tomb of Ra-nuer of the same line.

About two miles farther in the same direction are the Pyramids of Sakkarah, the greatest and most remarkable of which is called the Pyramid of Sibis. The tract around them appears from the number of the tombs to have been the principal burial-place of Memphis, to which it is near. The Pyramid of Sibis has a height of 196 feet 6 inches, and its base formerly measured on the north and south sides 351 feet 2 inches, and on the east and west 293 feet 11 inches. Within it are numerous passages and a gallery, which must, for the most part, have been made subsequently to the completion of the structure. In the centre is a very lofty and narrow chamber, and near it a small one, which was lined with blue tiles. In the latter was an inscription containing the title of the bulls Aps. Under the old monarchy those sacred animals were here entombed. It is thought that this pyramid was constructed by Uenephes of Dynasty I. If Manetho be correct in assigning the introduction of the worship of Aps to a later king, this
pyramid, if of Unesheps, was originally a royal sepulchre. In the tract between the Pyramids of Sakkarah and Abou-Seer are the remains of the Sarapeum, and the burnuplase of the bulls Apis, both discovered by M. Mariette. They are inclosed by a great wall, having been connected, for the Sarapeum was the temple of the defunct Apis. The tombs are in subterranean galleries or in separate excavations which contain many sarcophagi, in which the bulls were en­tombed. Not the least important result of this discovery is the certainty that Sarapus was a form of Osiris, and that his name was Heisiri-hapi, or Osiris-Apis (Brugsch, **Reiseberichte aus Aegypten**, 27, 305), as Sir Gardner Wilkinson had long previously suggested (**Matema Hieroglyphica**, 21, and **Vocab.** M. 8, 9). The other pyramids are of comparatively little interest. There are also some curious private tombs, among which may be particularized a large grotto excavated in the face of the rock overlooking the valley, which is remarkable for being vaulted on the principle of the true arch, but without a key-stone. It is of the time of Memnonius I. of Dynasty XXVI., being, as Sir Gardner Wilkinson remarks, one of the two earliest known examples of the arch in stone, though, as he adds, there are brick arches at Thebes of the time of Amenophis I. of Dynasty XVIII. (**Modern Egypt and Thebes**, i. 500–509).

The site of Memphis is marked by mounds in the cultivated tract to the east of the Pyramids of Sakkarah, and near the village of Most-Selahenouch. Of the great temple of Ptah, its tutelary divinity, there are no remains above ground, except a few blocks of stone and some broken statues, one of which is a fine colossal of Ramesses II., which may probably stood in ancient times before one of the principal entrances of the temple. It is of white chert, and beautifully executed, representing the king in a standing posture. It has fallen to the ground, and has lost part of its legs; nevertheless it has suffered considerable damage elsewhere, so as to be still one of the finest specimens of Egyptian art. The original height was more than 40 feet. This colossal is the property of the British nation, but no steps have been taken to remove it to this country. As Sir Gardner Wilkinson remarks, "when the Turks have burnt it for lime, it will be regretted" (**Modern Egypt and Thebes**, i. 373). The site of Memphis being in the cultivated tract, and near the modern capitals of Egypt, its monuments have alike suffered from the destructive power of nature, and from the barbarism of those who have used them as quarries or defended them from motives of fanaticism. The Pyramids have not escaped man's violence, but their vastness has generally defied his attacks.

At a distance of about five miles to the south of the Pyramid of Sekhem-Re is the northernmost of the Pyramids of Dahshoor, an interesting group, of the history of which not a certain is known. To their north is a vast truncated pyramid, the sepulchre of Unas, last king of Dynasty V., anciently called "the Most Beautiful Place," now Mastabat Farasun, or "Pharaoh's Seat." Two of the Pyramids of Dahshoor are of stone, and three of crude brick. The former exceed in size all the other pyramids except the Funis and Second of El-Geesheh, and have remarkable chambers within them. The Northern Stone Pyramid has a base of 700 feet, and a height of 326 feet 6 inches, and has lost somewhat of its size, having originally measured 719 feet 6 inches, and 343 feet 7 inches. Some of the eastern face, leading to three chambers of similar construction to the Grand Passage in the Great Pyramid. The Southern Stone Pyramid is distinguished by the peculiarity of its form and by having two entrances, one in the eastern face and the other in the northern. The lower portion has an angle of 54° 14' 46"., but the inclination then changes to 42° 59' 26". It has been supposed that it was suddenly completed, having been originally planned to be much loftier, but the method in which the pyramids were built renders this unlikely, and it seems rather to have been given this form to gratify a whim of the founder, as externally the entrances in different faces afford another peculiarity. Its base is 615 feet 8 inches, and its height 319 feet 6 inches. At its southern side is a small brick pyramid. The Northern and Southern Brick Pyramids of Dahshoor are to the east of those already described. They are now in a very ruined state, being merely mounds of crude brick; one of them is probably the Pyramid of Asychis mentioned by Herodotus.

Among the earlier explorers of the necropoleis of Memphis was Belonzi, by whom the Second Pyramid was opened. General Howard Vyse first undertook a complete examination of the series of pyramids, and having secured the assistance of Mr Perring, carried out this project with well-merited success. Professor Lepsius, the head of the Prussinan expedition, opened many tombs in the Memphite necropolis, and has published in his magnificent work (**Denkmaler aus Aegypten und Aethiopen**) the most interesting sculptures which they contain. M. Mariette, aided by the French Government, discovered the Sarapeum and the tombs of the bulls Apis, and has since continued his researches under the authority of the khedive.

The voyage up the Nile from Cairo may now be described. Not far south of Masr El-Attekahl, the mountain and desert approach very near the river on that side, and soon after the wide opening of a valley is seen. Beyond it is a bold promontory of the eastern range, which first gradually recedes and then becomes parallel with the river for some distance, leaving but a narrow strip of cultivated land. Behind the village of Turah, the ancient Thebes, are the quarries named after it, and a little farther to the south are those of El-Massaieh. These quarries are great excavated chambers and passages, which are entered by large square apertures in the steep face of the mountain. Hence were taken the finer blocks of limestone employed in the construction of the Pyramids of El-Geesheh. Tablets in both quarries record the quarrying executed under different sovereigns. South of the quarries the character of the eastern bank continues unchanged, and presents no remarkable object until we reach the promontory of the Sheykh Abou-Noor, which will be subsequently mentioned. The western bank, on the contrary, is broad and fertile, abounding in villages, and above its palm-groves rise in the distance the massive forms of the long series of pyramids. Considerably beyond those of Dahshoor, which may be considered the most southern in the Memphite necropolis, are the two Pyramids of El-Metaweeyeh, which are too small to be seen from the river, and yet farther the solitary Pyramid of Meydoon, commonly called the False Pyramid.

Dr Brugsch thinks it very probable that it was the tomb of Semannur, last king of Dynasty III. It is a structure of great size, having a base of about 400 feet, and a height of about 310 feet. In consequence of blocks having been pulled off its sides for building purposes, it has the appearance of being built in two degrees, the lower of which is much greater than the upper, while the fallen stones around its base make it seem as if raised upon an eminence to increase its apparent size, and hence its name. The entrance has not been discovered. Its position, rising alone above the rich valley and desert beyond, without any object by which to measure its size, render this pyramid, especially when seen from some distance across a broad strip of the river to the north, a very striking object. There is nothing else worthy of a visit on the western bank until...
we reach the town of Bence-Suéf, about seventy miles by the course of the river from Cairo.

Bence-Suéf is a busy town, being the port of the Faiyoom. A road leads hence to that province, in a north-westerly direction. After crossing the great canal called the Baher-Youssef, we pass through the opening in the Libyan range which leads to the Faiyoom, leaving on our right the ruined brick Pyramid of El-Łahoon, so called from an adjacent village.

The Faiyoom, including its lake, is a pear-shaped tract (its narrowest part being to the west), extending into the desert, and measuring in its greatest length about thirty miles, and in its greatest breadth about twenty. The part now cultivated is more than two-thirds of this extent from the east. At the north-western extremity is the great lake of El-Karn, which is long and narrow, and fills the northern portion of the valley. A branch of the Baher-Youssef flows through the opening leading to the Faiyoom. This canal soon spreads into many streams, two of which, after joining into a single course, carry off the superabundant waters of the inundation into the lake of El-Karn, while they contribute with the others to irrigate the cultivable tracts.

The site of the famous Labyrinth first claims our notice after leaving the Faiyoom. Its position may be known by a ruined crude brick pyramid, that of Hawaráh, which is spoken of by both Herodotus and Strabo, and may be called the Pyramid of the Labyrinth. The remains of the Labyrinth itself, which had been previously known, were first carefully examined by the Prussian expedition headed by Professor Lepsius, in 1843. The structure was so ruined, however, that the results were not as decisive as might have been hoped. Yet the plan was to some extent made out, and the building shown to have contained a great number of very small chambers, as ancient writers had said; and the discovery of royal names of Dynasty XII., particularly of Aménemhat III., to whom Manetho ascribes the founding of the Labyrinth, leaves little doubt that this was the Morís who built the Labyrinth, according to the classic writers. The use of this building has not been distinctly ascertained. Manetho indeed makes it to have been the founder's tomb, but it is most probable that he was buried in the pyramid, which, however, the Egyptian historian may have regarded as part of the Labyrinth, as it is evidently connected with that structure.

Not far beyond the site of the Labyrinth is the capital of the province, usually called “El-Medémén,” or “El-City,” and “Medéenat-el-Faiyoom,” “the City” or “Capital of the Faiyoom,” close to the mounds of the ancient Arunoe, or Crocodilopolis. It is a small but flourishing town. The only monuments of antiquity in its neighbourhood are the remains of Beyhoom somewhat to the north, and the great broken tablets at Begeeg, at a smaller distance to the south. The former are two structures supposed by some to be pyramids, and the latter, which is a record of the time of Usurteen I., is usually called an obelisk, but it must rather be regarded as a very tall and narrow stele or tablet, upwards of 40 feet in height.

In this part of the Faiyoom, to the north of El-Medémén, may be traced the remains of that remarkable hydraulic work the Lake Morís. M. Linant, a French engineer, was the first to determine the position and character of this famous work of antiquity; and the results of his investigations are in accordance with the observations of some who had previously noticed the subject in published works (“Mémoire sur le Lacs Morís,” Soc Ég., 1843). The object of the Lake Morís was to regulate the irrigation of the Faiyoom, anciently the Crocodilopolite Nome, and afterwards the Arinóite; and it was valuable on account of its fisheries. It seems rather to have deserved the name of a very large reservoir than that of a lake. Notwithstanding the drying up of the Lake Morís, the Faiyoom is still an important and fertile province. It produces very large quantities of grapes; and the fields of roses, cultivated for the sake of rose-water, present a remarkable appearance.

The great Lake of El-Karn is perhaps the most interesting object in this part of Egypt. Its name, Birket-el-Karn, signifies “The Lake of the Horn,” or “Projection,” by which an island is intended, and not its general form, as has been supposed. It is, according to Sir Gardner Wilkinson, about 35 miles long and about 7 broad at its widest part and is not deep, as far as has been ascertained. The water is brackish and unwholesome, though derived from the Nile, which has at all seasons a much higher level. It is bounded on the south by tracts in a state of cultivation, but deserted for want of labourers, though anciently cultivated, and on the north by the Libyan desert, above which rises a bold range of mountains; and it has a strange and picturesque wildness. Its northern shore was anciently cultivated, at least in part, but is now entirely waste. Near the lake are several sites of ancient monuments.

The Egyptian historian may have regarded as part of the Labyrinth, as it is evidently connected with that structure.

The water flows through the opening leading to the Faiyoom, and the temple called Kasr-Károm distinguishes the most important of these. That temple, however, being devoid of sculpture, and does not possess the Roman period, could not attract attention except in a region barren of monuments.

After this cursory view of the Faiyoom we may return to the Nile and continue our southward course.

Not far south of Bence-Suéf the eastern chain is washed by the river at the picturesque promontory of the Shékh Aboo-Noor, whose tomb stands on its summit. From this point as far as the town of Manfaloot the mountains on the east are close to the Nile, leaving a narrow space of cultivable land, on the northern portion of which are several sites of ancient towns, of which the most remarkable are the sepulchral grottoes of Benee-Hasan, which are inferior to those of the Crocdillopite Nome, and shared the same fate at his hands.

These are of the age of Dynasties IV. and VI., but they have sustained so much damage in modern times that they do not repay a visit, except from one who is a student of hieroglyphics. A governor of El-Minyéh, an ignorant Turk, used these ancient tombs as quarries; and had it not been for the interference of Mr Harris of Alexandria, the more important grottoes of Benee-Hasan would have shared the same fate at his hands.

The first noteworthy objects above El-Minyéh are the sepulchral grottoes of Gebel-ès-Tyre, the most remarkable of the latter being at a site called El-Kom-ès-Ahmar, or “the Red Mound.” These are of the age of Dynasties IV. and VI., but they have sustained so much damage in modern times that they do not repay a visit, except from one who is a student of hieroglyphics. A governor of El-Minyéh, an ignorant Turk, used these ancient tombs as quarries; and had it not been for the interference of Mr Harris of Alexandria, the more important grottoes of Benee-Hasan would have shared the same fate at his hands.

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cultivable land. The grottoes are almost in a line near the summit of the mountain, and at no great height above the river. The two northernmost are remarkable for having poricoes, each supported by two polygonal columns of an order which is believed to be the prototype of the Dore. Most of the grottoes are adorned with sculptures and paintings, which portray with eminent truthfulness and character the manners of the Egyptians of the remote period at which they were executed, for they are tombs of monarchs and other governors of Dynasty XII. They generally consist of a chapel of large dimensions, having sometimes a portico before it, and a niche with seated figures of the chief persons buried in the tomb at the extremity, and have pits leading to sepulchral chambers. The principal apartment is sometimes supported by pillars cut out of the rock, and vaulted. Its walls bear representations of the diversions of the occupant during his lifetime, and of his varied occupations, in scenes depicting hunting, fishing, games, feasts, the processes of agriculture, and the like. The figures of beasts and birds, more especially the latter, are characterized by a remarkable fidelity and beauty, and there can be no doubt that Egyptian art had attained a greater excellence at this time than it possessed under Dynasty IV. A little to the south of these grottoes, in a ravine, is the Speos Artemidu, a small rock temple of Sekhert or Pakh, the Egyptian Diana, and some sepulchres of little interest.

A few miles to the south of the Speos Artemidu are two sites, one on either side of the river, which were marked, in the present century, by most important monuments, which have since been destroyed by the Turks. That on the western side, near the large village of El-Ashmooney, the ancient Hermopolis Magna, was part of a magnificent portico, bearing the names of Philip Ardeus, Alexander Egnus, and Polymy L., all that stood of the temple of Thoth, and on the opposite side of the river were considerable remains of the edifices of the town of Antinoopolis founded by Hadrian. While we regret the destruction of such interesting records, we must not charge either the Turks or the native Egyptians with all the mischief of this kind which is perpetrated, and our sorrow is increased by the reflection that to European travellers, principally Englishmen and Americans, must be assigned no small share in the destruction or mutilation of the monuments, which in the case of educated men is nothing less than a crime.

A short distance south of Antinoopolis is the town of Melawa, on the western bank, and a little farther, on the other side of the river, the promontory called Gebel-esh-Sheykh Sa'eed, which is honeycombed with grottoes, some of which are shown by their sculptures to be very ancient, but are so ill preserved as to require but a short examination. A little beyond, however, in the district of Tell-El-Amarnah, or the Mound of El-Amarnah, a small fertile tract where the eastern mountains recede, noted, like Benc-Hassan, for the turbulent and thievish propensities of its inhabitants, are most curious remains of a very ancient town. It was the capital of Khn-n-aten, the sun-worshipper of Dynasty XVIII., and was not destroyed by Horus, and not subsequently rebuilt. In the mountain behind it are very interesting sepulchral grottoes, in which were buried the courtiers of this king, and from them we obtain much information respecting his religion, a very pure form of sun-worship. The representations are chiefly of the king, his queen, and their children, distributing presents to the soldiers and others, of acts of worship to the sun, and of the temple of the sun as well as gardens and villas.

A little farther up the river, on the north side of the Nile, a little to the south of Tell-el-Amarnah, is the small town of Dercot-esh-Sherreef, supposed to be on the site of the Thebaica Phylace, which guarded the northern boundary of the Thebaa. About 20 miles to the south is the town of Manfalout, on the same side of the river, which has a decayed appearance from the manner in which the stream has encroached upon and washed away part of it. Opposite to Manfalout in the eastern range are extensive crocodile-mummy catacombs.
of Abydos as a reputed burial-place of Osiris rendered this a favourite necropolis of the ancient Egyptians from very early times, particularly under Dynasty XII.

At a distance of more than 40 miles from Abydos, but in nearly the same latitude, is the village of Dendarah, on the left, near the southern bank of the Nile. Before reaching it we pass the small town of Farshout at the mouth of the great canal called the Bahr-Yosuf, and the large village of Hoo, marking the site of Dendera Farra Opposite the latter place are some sculptured grottoes in the eastern chain, called those of Kuer-ese-Sayad, which is believed to occupy the position of Chaotkosoecon. They contain names of kings of Dynasty VI, but the representations which occupy their walls are not of unusual interest. At Denderah is the first well-preserved and unencumbered temple that is seen in a voyage up the Nile, that of Abydos, the Egyptian Venus, who presided over the town of Tentyra, or Tryenti, the capital of the Tentyrites. It stands on the mounds of the town about a mile and a half from the Nile. From it we gain a good idea of Egyptian religious architecture under the Greek and Roman dominations.

The temple is surrounded by a great wall of crude brick, entered by a stone portal adorned with sculptures representing the emperors Domitian and Trajan, engaged in acts of worship before several divinities. The portico to which it leads is about 355 feet in width, and is one of the richest and most beautiful structures of the kind. It is supported by twenty-four columns, four deep, nearly 50 feet in height, and having a diameter of somewhat more than 7 feet at the thickest part. The capitals have a full face of Athor sculptured on each of their four sides, and above these a kind of shrine. The three columns on each side of the entrance are connected by an intercolumniation. The portico, like the rest of the temple, is of higher merit as regards its architecture than its sculpture, for the latter art had declined under the Greek and Roman rule to a much greater degree than the former. The sculptures are of the same kind as on the portal, representing offerings made by some of the earlier Caesars; and on the ceiling are various mystical subjects, probably of an astronomical import, and the famous Zodiac from which an extravagant idea of the antiquity of the temple was deduced before hieroglyphic decipherment. The greater part of the back wall of the portico was the front of the temple before this portion was added. The inner part consists of three considerable chambers, an isolated sanctuary, and numerous small apartments. The first of these is a hall, supported by a double row of columns, three on each side, of a rather heavy form, for they have, beneath the capital formed of the block with the faces of Athor and the shrine, another capital of a cup shape. The hall is entered by a doorway in the middle of the back wall of the portico, and passing through it we reach a second and third chamber of the same breadth but shorter, and then the sanctuary. This chamber is much narrower, and is isolated by a passage running round it. On each side of the chambers and passage are many small apartments, two passages to the exterior, and two staircases, and there are singular inclined passages in the walls, two of which are entered from the sides of the portico. The whole interior is covered with sculptures and inscriptions of a religious character, stating in a systematic manner the use of each chamber in the temple-worship. The royal names have not always been filled in, the rings remaining vacant; but when they have been sculptured, they are generally those of the last Caesars, and Ptolemy Caesar, his son by Julia Caesar. On the roof of the temple to which the staircases lead, there is a sort of chapel and some small chambers, one of which is very interesting, because its sculptures relate to the myth of Osiris. The exterior of the temple is as completely covered with sculptures as the interior. Among the figures represented here are those of Cleopatra and Ptolemy Caesar; but they cannot be supposed to convey any resemblance, since they belong not alone to a conventional art, but almost to its lowest period. There are two smaller temples near the great temple of Athor, one of Ias, and the other of the kind called a Typhonomum. Both are of the Roman time. See admirable account of the temple in Marrot's Monument de l'Upper Egypt.

On the opposite side of the Nile, a little above Dendara, is the town of Kus, between which and Arbusa so little traffic is carried on by the route through the desert to Kusey on the Red Sea. The best of the porous clay bottles which are used throughout Egypt are manufactured here, and the great water-jars, called "bellases," which the women carry, are made at the large village of Bellas, a few miles higher on the western bank. Opposite to Bellas is the village called Kus or Kift, marking the site of the important town of Copos, which was the emporium on the Nile of the Araban and Indian trade under the Ptolemies, and, somewhat to the south, is the considerable town of Koss, the ancient Apollinopis Farva, which succeeded to the trade of Copos, under the Mutasius, until Knill supplanted it. On the western edge of the small town of Nakadeh, which the people call Nagadeh, where are Roman Catholic and Coptic convents. A short distance beyond Nakadeh are the northernmost of the remains of Thebes.

The monuments of Thebes do not present from afar the imposing appearance of the Pyramids of Memphis. Placed for the most part at a distance from the Nile, as well as from one another, and having on the western side the picturesque mountain, they are the most suitable object for inland navigation. The monuments of Thebes do not present from afar the imposing appearance of the Pyramids of Memphis. Placed for the most part at a distance from the Nile, as well as from one another, and having on the western side the picturesque mountain, they are the most suitable object for inland navigation.
city was on the eastern bank, where is the great temple, or rather collection of temples, called after El-Karnak, a modern village near by. The temple of El-Karnak is about half a mile from the river, in the cultivable land. More than a mile to the south-west is the temple of El-Uksur, on the bank of the Nile. On the western bank was the suburb called the name Monanmah. The temple near the northermost of the temples on this side, the Setheem, almost reaches the river, near the edge of the desert, which has been sculptured over another subject, of those of several places in the eastern approaches to the river, being the greatest of the temple, and several smaller structures, surrounding it. The grand entrance is through a propylon more than 360 feet wide, for this is its measure above the rubbish which is piled up around it. It was never sculptured, nor was its surface smoothed. It presents, therefore, a rude appearance, and is much ruined. A great part of the left or northern wing having been demolished. The court of which the propylon forms the front measures 322 feet in width and 375 in length, having on each side a gallery with a single row of columns, and a double colonnade, of which one column alone stands, formed an avenue from its entrance to that of the hypostyle hall beyond. On the right side a temple of older date interrupts the side gallery, extending 50 feet into the court. Its front is formed by a propylon, about 90 feet wide, on each wing of which tremendous sculptures are of the reign of Ramses III, but the names of later sovereigns occur. On the other side of the great court is a small structure which may be a chapel, or three chapels. The most interesting sculptures in this part of the group of temples are outside the eastern portion of the south wall of the great court, for here is the famous list of countries and towns subdued by Sheshonk I, or Shishak, the head of Dynasty XXII. Among the names is that thought to be the kingdom of Judah, and those of several places in the dominions of Rehoboam and Jeroboam I. At the end of the court is a fine portal, the wings of which are much ruined. This is the entrance to the great hypostyle hall, the most magnificent work of its class in Egypt. Its length is 170 feet, and its width 329 feet, supported by 134 columns, the loftiest of which are nearly 70 feet in height, and about 12 inches in diameter, and the rest more than 40 feet in height, and about 5 feet in diameter. The great columns, in a number, form an avenue through the midst of the court from the entrance, and the others are arranged in rows very near together on each side. There is a transverse avenue made by two rows of the smaller columns being placed farther apart than the
rest. This great hall is therefore crowded with columns, and the effect is surprisingly grand. The spectator, being generally unable to see beyond the columns which are immediately around him, perceives the vast dimensions which, if viewed from a distance, might lose their effect. The forest of columns seems interminable in whatever direction he looks, producing a result unsurpassed in any other Egyptian temple. The partial ruin of its stone roof, and of some of the columns, love stone in Egypt, the more picturesque, and makes us wonder at the forces which must have been expended in attempting to demolish it. This grand hall was built by Setee I., Dynasty XIX., and sculptured partly in his reign and partly in that of his son and successor Ramses II., who has sometimes effaced his father's name to substitute his own. It commemorates, not in its grandeur alone, but also by its sculptures, the magnificence and power of these two great Pharaohs. The sculptures of the interior of the walls represent these kings making offerings to the gods, and the like subjects occupy the columns. Far more interesting are those which adorn the exterior of the walls, and record the achievements of the same kings, those of Setee I. being on the north wall, and those of Ramses II. on the south. The former are of much greater interest than the latter, as far as we can judge, and in this respect in no more in Egypt than elsewhere. The scenes on the north wall are arranged in three compartments, of which the upper one has been nearly destroyed. In these scenes the king is represented of a gigantic size, charging in his chariot, and putting to rout his enemies, capturing their strongholds, and returning home in triumph. The chief nations are the Ketesh or Hittites; the Kutesh (Luten), at this time a great nation of Syria; the Shasu, or Arabs; the Khatts, Syrians, or Syrians; and Remenen, Armenia. Among the captured places is Kekekh, in those days the most important stronghold between Egypt and Mesopotamia. There is also a long list of countries, cities, and tribes, conquered or ruled by the king, among which we find Naharain, that is Aram-naharaim, or Mesopotamia, Keesh, Kush, or Ethiopia, &c. The battle-scenes of Ramses II. on the south wall do not, as far as they are seen, equal those in interest. Here also is a list of the king's conquests and possessions, and on the west side of a wall which joins this one at right angles, forming the side of a court of the southern approach to the temple, is a representation of the capture of Ascalon or Askelon, and an inscription recording the treaty between Ramses II. and the Ketesh, concluded in the twenty-first year of his reign. The back of the hypostyle hall is formed by a ruined propylon bearing the name of Amenophis III., and then at a distance of about 50 feet is another propylon, entirely ruined. In the space between these propylas, which was a court, stands a beautiful obelisk of red granite, upwards of 70 feet high, raised by Thothmes I. The fragments of its fellow, which was more to the north, slew the ground. Behind the second of these propylas is another granite obelisk, 108 feet high, and according to M. Mariette the loftiest known (Monuments of Upper Egypt, 170). This great obelisk of El-Karnak is a monument of Queen Hatshepsut of Dynasty XVIII., and an inscription on its pedestal records the period which elapsed (nineteen months) from the time that it was begun to be cut in the quarry until its completion in the queen's sixteenth year. The fellow of the great obelisk, which stood to the south of it, has been broken, and its fragments occupy its place. Beyond the great obelisk is the chief sanctuary, a structure almost entirely of granite, divided into two apartments, which was built under Philip Aridaus, in the place, no doubt, of one destroyed by Cambyses or Ochus. The space between the hypostyle hall and this sanctuary is extremely ruined, the huge stones being piled up in heaps as though an earthquake had overthrown the temple. But this destruction was probably due to human violence. Behind the sanctuary are fragments of a very ancient part of the temple, bearing the name of Amenophis I. and Dynasty XII. Considerably farther is a large oblate building of the time of Thothmes III., which affords a remarkable example of architectural caprice, its columns having inverted shafts and capitals, and its cornices being likewise inverted. Behind this and a stone wall are ruined chambers, and far beyond, directly behind the centre of the great temple, in the crude brick wall of inclosure, is a handsome portal, never finished, bearing the name of Nectaneboes II.

The southern approach to the temple of El-Karnak from that of El-Ukns is, as before mentioned, by a ruined avenue of sphynxes, which ends near the great structure, and two other avenues begin. The westernmost of these, which is of colossal rams, conducts to a temple situate not far to the south-west of the first court of the great temple: we approach it through a stately portal bearing in its inscriptions the name of Ptolemy Euergetes I. The front of the temple, before which was another avenue of rams, is a propylon, which is almost unjured. Behind it is a court having a double row of columns on each side, and at the end, and again behind this is a hall supported by eight columns, and many and small chambers. This temple was dedicated to Khons, the third member of the Theban trund. It was begun under Dynasty XX., and continued by the high-priest kings. A small edifice having sculptures of the time of the Greek and Roman rule stands on the west of the court of this temple.

The avenue of sphynxes which branches off at the same place as the avenue of rams leading to the temple of Khons takes an easterly direction and ends where another begins at right angles to it, which connects the southern courts leading to the great temple with a separate inclosure. The latter contains a lake which has the shape of a horsehoe, and the remains of the temple of Mut. At the northern extremity of the avenue, which is of cricosphynxes, is a propylon forming the front of a large court ending in a second propylon, which, like the other, is much ruined. Beyond this, but not in exactly the same direction, after a vacant space, the approach continues through two or smaller propylae, the second of which is nearly destroyed. Each fronts a court, and at the end of the second of these courts was the great side entrance to the temple. The first and second propylae were, like the cricosphynxes, monuments of King Har-em-heb, or Horus, of Dynasty XVIII., and were partly built of materials of a temple or palace of the sun-worshipping kings whom he overthrew. The third propylon is more ancient, for it bears the name of Thothmes III. and Amenophis II., as well as of subsequent kings; the age of the fourth is not certain; the name of Ramses II. occurs here, but it may have been founded before his time. There is an inclosure in the angle formed eastward by the third and fourth propylae with the great temple, which contains a sacred lake.

Adjoining the great crude-brick wall of inclosure at its north-eastern portion is another containing the ruins of an important temple. The chief approach is through a stately portal of the Ptolemaic period, in the crude-brick wall. The temple to which it conducted was very beautiful and costly, as we can judge from its remains, which show with how much violence it was destroyed. It seems to have been founded under Dynasty XVIII. There are two small temples or chapels, one of the time of Achoris and the other of that of Nectaneboes I. and II., in the same inclosure. Another crude-brick inclosure of small dimensions, near the south-east corner of that of the great temple, contains some unimportant remains of a small edifice.

This brief description will convey some idea of the dimensions of the temple of Amen-ra at Thebes, with its...
appended; but no one who has not seen that wonderful assemblage of ruins can picture to himself the massiveness of its castle-like propylies, the grandeur of its hall of columns, the beauty of its great obelisk, and the sublimity of its heaped-up ruins. Of the city of Thebes there are scarcely any remains. Doubtless its edifices were of perishable materials.

Beginning our examination of the monuments of the western bank, where was the great suburb of the Memnonia, from the northward, the first object of interest is the Setheum, a small temple of Setee I., which the natives call Kaar-Er-Rubeyk, at the ruined village of El-Kurnehe. A portico, originally supported by ten columns, of which two have fallen, extends along the whole front of the building. Three entrances lead into the interior of the temple: the middle one of these is the door of a hall having twelve columns. From this apartment we pass into several small chambers, which are of little interest, like the ruined chambers which we enter from the northern door. The southern door is the entrance of a separate part of the edifice, which contains a small hall supported by two columns, and three chambers behind it, the middle one of which was a sanctuary or chapel, devoted, as its sculptures show, to the worship of Ramses I., the father of Setee I. The inscriptions of the temple tell us that it was dedicated to Ammon by its founder Setee I., and continued by his son Ramses II., and his grandson Menephtah. It was the funerary chapel of the tombs of Ramses I. and Setee I.

The great temple of Ramses II., which may be called the Ramesenm of El-Kurneh, but is commonly though incorrectly known as the Memnonium, is situated at a distance of about a mile to the westward of the Setheum, and is like it on the edge of the desert, which here is much farther from the Nile. Notwithstanding that its condition is much more ruined than that of other edifices of Thebes, the beautiful architecture of what remains, and the historical interest of its spirited sculptures, render it altogether second alone in its attractions to the great pile of El-Karnak. A propylon, 225 feet in width, of which a great part has been thrown down, forms the front of the edifice. Through its portal we enter a spacious court 180 feet wide and 142 long. It had originally a double colonnade on either side, every column of which has been destroyed, while the side walls have been entirely demolished and the end wall partially. On the back of the propylies are sculptured a battle and other scenes of a campaign in the king's eighth year. This court is one of the most beautiful objects at Thebes, a colossal statue of Ramses II., broken in pieces, exceeding in its weight and equaling in its dimensions any other known Egyptian statue. It was of a single block of red granite, and must have been transported hither from the quarries of Syene, notwithstanding that its weight was, according to Sir Gardiner Wilkinson's computation, about 887 tons, 54 cwt. (Modern Egypt and Thebes, ii. 144, 145). It was 60 feet in height, representing the king seated on his throne, and was placed on the left side of the entrance to the second court. Of that court, happily, there are more remains than of the first. Its width was about 170 feet and its length about 140, so that it was not much smaller than the other court. It had a double colonnade on each side and at the end, and but a single colonnade at the front. These were of columns having capitals of the form of the papyrus bud, except eight of the ten forming the front row, that is, all of that colonnade but the two extreme columns, and, in like manner, the corresponding ones of the opposite row, which were Cairene pillars, formed of a square block, having in front a figure of Ramses as Osiris. Many of the columns and pillars have been wholly destroyed; but those which yet stand enable us to judge how magnificent this part of the temple must have been. On what remains of the front wall of the court, that is, on its northern half, are very remarkable sculptures. Here is a great scene representing a battle between the Egyptians, led by Ramses II., and the Kheta or Huttees, near the strong city of Kesh. The king of Egypt is portrayed routing the chariots of the enemy, who flee in disorder towards Kesh, across a double moat, beyond which and beneath the city a strong force of regular infantry endeavours to protect their retreat. This was doubtless the decisive action of the campaign against the confederates, which must be regarded as the most important of the wars which distinguished the reign of Ramses II. Higher up on the same wall is a procession of priests bearing small statues of kings, the first of which is that of Menees, the earliest sovereign of Egypt, the second of a Munkt-hopt, of Dynasty XI., and the subsequent ones of the kings of Dynasties XVIII. and XIX., as far as Ramses II., with whom the series ends.

Next to the second court is a hypostyle hall, which is the most admirable part of the temple. It measures 100 feet in length and 135 in breadth, and originally contained forty-eight columns in eight longitudinal rows, each consisting of six columns. A central avenue is formed by twelve lofty columns, about 36 feet high, which have capitals of the shape of the papyrus flower, while the other columns on each side, about 25 feet high, have capitals of the shape of the bud of the same flower. The elegance of the form and the justness of the proportions of all these columns is not equaled in any other Egyptian temple, and render this hall one of the most beautiful structures of its kind. Happily, although much injured, it has suffered less from violence than the first and second courts. On its front wall, to the left as one enters, are curious sculptures, representing the rout of a hostile force, and the capture of a town, the walls of which the Egyptians ascend by means of scaling ladders. Ramses II. and six of his sons lead the army. On the end wall are religious subjects, and a series of the sons and daughters of Ramses II., whose legitimate offspring they seem to have been, twenty-six in number, twenty-three sons and three daughters. At the temple of Wadee-es-Suboo'a, in Nuba, a much larger number of children of this king were represented.

Beyond the hypostyle hall are two smaller chambers, the first of which is entered by a doorway in the middle of the end wall of the hall. It is supported by eight columns, and has on its walls representations of mythological subjects, but is chiefly remarkable, however, for its astronomical ceiling, one of the most precious records of ancient Egyptian science. Behind this is a chamber, which seems to have been of the same dimensions. The other apartments which must have adjoined these are entirely demolished. This temple was the chapel of the king's tomb. The description which Diodorus Siculus gives from Hecataeus of Abdera of the Tomb of Ozymandias agrees best with the Ramesenm of El-Kurneh; and the mention of the sacred library is in accordance with the character of the sculptures of the first chamber beyond the hypostyle hall, as well as with the statement in several papyri that they were written by the scribes in this temple, in which, or attached to which, was a kind of college (Lepsius, Chronologie der Aegypter, i. 39, 53).

To the south-west of the Ramesenm of El-Kurneh, at a distance of less than half a mile, a mound just within the cultivable plain marks the site of a magnificent temple of Amenophis III., which may be called the Amenophum, and which, there is reason to believe, was destroyed by Cambyses. Of the columns and columns which stood on either side of the approach of the Amenophum, all are thrown down except the two gigantic statues, one of which is known as the Vocal Memnon. The latter indeed, was
beneath which is a gateway conducting to the great
temple. On the front of each of the two towers first
mentioned Ramses III, is represented slaying his enemies
before Amen-ra, and below is a series of captured chiefs.
The inscriptions that remain tell us that these are the chiefs
of the Kheta, or Hitites, the Amari, or Amorites, the
Takkara, or Tercianas, the Sharana or the sea, or
Sardones, the Tivabas or the sea, or Tutsans, and of other
peoples. On the walls of the chambers are curious
sculptures usually supposed to represent the private
life of Ramses III., but probably of a mythological import.
Among these the king is portrayed playing at a game
like that of draughts with a goddess, while another
audits by him.

The great temple of Medeenet-Haboo is directly behind
the palace through which was, as already mentioned, the
approach to it, and is a monument of the same kind,
Ramses III., a sovereign inferior alone as a conqueror to
Ramses II., the greatest ruler of Egypt. Both the
magnificence of its architecture, and the high interest of
its sculptures, render it one of the most interesting edifices
at Thebes.

The first propylon cannot be less than 200 feet wide.
It is partly destroyed, and much of it is hidden by the re-
 mains of the town. On its wings the king is represented
singing prisoners before the gods, and acts of worship are
also depicted. The court, of which this propylon is the
front, is about 110 feet in length and 135 in breadth,
and has a colonnade on either side, forming a gallery.
The gallery on the right side consists of seven Osiridean
pillars, that on the left of eight columns having capitals of the
form of the papyrus-flower, affording a remarkable example
of the irregularity of Egyptian architecture. At its end is
a second propylon, on the left wing of which Ramses III.
is represented bringing captives of the Takkara, or
Tercianas, before Amen-ra. Passing through the granite
portal of this propylon we enter the second or peristyle
court, the finest part of the temple. This court measures
about 123 feet in length, and about 135 or somewhat more
in width, thus exceeding in size the first court, contrary to
the usual practice of ancient Egyptian architects. It has
a single colonnade on the front and on either side, and a
double one at the end. The columns at the front and
that facing it are each of eight Osiridean pillars, while
that behind the latter is of columns with capitals of the
papyrus-bud, and the side colonnades consist of each five
similar columns, one of which, on the left side, has fallen.
The Christian inhabitants of the town, the ruins of which
church are seen in the court, defaced many of the
sculptures, and particularly the Osiridean pillars; neverthe-
less the general effect is not lost, and one is struck by a
simple grandeur, which is unsurpassed in any similar
Egyptian structure. The sculptures of the walls are of
special interest. On the back of the left wing of the
propylon a series of sculptures relating to the wars of
Ramses III., begins and extends along the wall on the left
side of the court. The rout of the Rebu or Lebu, the
Libyans, is depicted, the triumphal return of the king, the
bringing of prisoners before him on the field of battle, and
the like; and besides these are subjects portraying cere-
omies. On the right side-wall is a curious representation
of the celebration of the Panegyry of Amen-ra Ka-mut-f
which, from the detail in which it is given, affords us con-
siderable insight into the manner in which such solemnities
were kept (Sac. Eg., iv. pl. 76). On the end wall, and on
each part of each side wall, are depicted the many children of
Ramses III. A door in the end wall conducts to the
inner part of the temple, which occupies but little less
space than the two courts just described. It is in a very
ruined condition.
from the shore. Ramses then receives the praises of which the Egyptian fleet defeated that of the Shardana and end wall the king is portrayed setting forth on an drawn by four oxen. Mercenaires or allies of the Shardana, another small temple of Roman times, having an other battle-scenes of the series represent the capture of the Takkaru and Rebu, before the gods of Thebes. The scenes in sanctuary and other chambers.

Farther in the same direction is an account of them other monuments. Two temples which are situated in the valley, and in two isolated hills, except the Tombs of the mountains, or are excavated in the sides towards the valley, and in two isolated hills, except the Tombs of the Kings, which are cut in the sides of two secluded valleys to the westward.

Beginning from the north, we first see the entrances of grottoes in the low spur of the Libyan chain behind the Soheuem. Several of these have a series of square apertures, leaving pillars to support the roof, so as to form a kind of portico, behind which is a chamber or chambers, having pits, from which open other chambers for sepulture. Some grottoes here, and others extending towards the Rameseum, are inhabited by the people of El-Kurnet-Mara'ee, whose village is ruined. At the foot of the mountains, as well as on their least steep sides, here and throughout the necropolis, are the entrances of many mummy-pits. On the spur above mentioned are brick pyramids, for the most part nearly destroyed; and in the wide tract beyond, the

Asaseef, where the mountains recede, are very remarkable sepulchres of the time of Dynasty XXVI. These are extensive excavations, profusely sculptured almost entirely with hieroglyphics, having before their entrances open courts hewn in the rock, and entered through crude-brick propyla, from which walls of enclosure of the same material extend around the courts. The largest of these, and indeed of all those known at Thebes, is the tomb of Petamen-apt, a priest whose date is not fixed, but who probably lived after the fall of the Ramessides. Sir Gardner Wilkinson says that "the area of the actual excavation is 22,217 square feet, and with the chambers of the pits 23,809, though, from the nature of its plan, the ground it occupies is nearly one acre and a quarter" (Modern Egypt and Thebes, ii. 322). Almost all the passages and chambers are covered with hieroglyphic inscriptions on a small scale, and the few sculptures are of a religious character. At the end of the Asaseef is a temple which was approached by a very long avenue of sphinxes now entirely demolished. The temple is at the base of a steep cliff, and is partly excavated in the rock, and partly built of masonry. The built portion is almost wholly destroyed. A portal of red granite which formed its entrance yet remains, bearing the name of Thothmes III, cut over the erased name of Queen Hatshepu. A second granite portal stands behind this, almost close to the rock. At some distance to the left of this are two small chambers, one of which is remarkable for the form of its roof, which is vaulted by horizontal stones, of which the two uppermost meet in the centre, all being cut internally, so as to form an arch. The excavated part of the temple consists of an oblong chamber of moderate dimensions, another of smaller size with a cell on each side, and at the end a sanctuary. All these, except the sanctuary, are of the time of Queen Hatshepu and Thothmes III, and have vaulted roofs. The sanctuary bears Ptolemaic sculptures, affording a remarkable contrast to the delicate style of those of the chambers which lead to it, and it is flat-rooted. This temple was probably sepulchral.

The isolated hill of the Sheyk'h Abd-Al-Kurneh (probably a mistake for 'Abd-Al-Kurneh, meaning 'the Devotee of El-Kurneh"), presents a singular appearance from the plain, as on that side it is honeycombed by the entrances of tombs. Several of these, like some of those first mentioned, have porticoes before them hewn in the rock, and many have very interesting paintings, representing scenes of domestic life, funeral ceremonies, arts, trades, &c, in their chapel or chapels. These have unfortunately suffered greatly from the disgraceful Vandalism of European travellers, and the cupidity of the natives which they have encouraged. Farther towards Medinet-Haboo is a similar isolated hill, called Kurnet-Mara'ee, which contains a few grottoes of the same description, and in the valley between these and the main mass of mountain are many other interesting grottoes. At one extremity of this valley, at some distance behind the Rameseum, is a small edifice with a high inclosure of crude-brick walls. It is a temple of Athor, of the Ptolemaic period, and has a small portico and three chambers, one of which, the side chamber to the left, is a curious sculpture, of which the subject is the judgment of a soul by Osiris. Hence we may infer that this was a temple attached to the necropolis. Beyond the other extremity of this valley is the secluded valley called that of the Tombs of the Queens, from containing the sepulchres of queens and princesses of Dynasties XVIII., XIX., and XX. These are similar to the Tombs of the Kings, but are not large, nor are the subjects on their walls, which seem generally of little interest, well preserved.

A long and winding valley, the entrance to which is an
The tomb of Rameses III. is among the most splendid of the royal sepulchres. Its length a little exceeds 400 feet, but from the nature of the rock its sculptures are less delicately executed than those of the tomb of Setee L. In cells on either side of its passage, a little within the entrance, are interesting paintings illustrating manners and customs, in one of which is the celebrated representation of the harpers.

The tombs which have been found in the Western Valley are only four in number, but two of these contain paintings, those of Amenophis III. and of King At, the sun-worshipper who succeeded Khu-n-aten. The former is represented with paintings in a very good style, but unfortunately they have sustained much damage; the latter is historically interesting as a record of an obscure king, but its paintings are of poor execution.

Nowhere, perhaps, are we so forcibly struck by the feeling of the ancient Egyptians with respect to death and the future state as in the Valley of the Tombs of the Kings, and in the sepulchres themselves. The desolation of the spot, apart from all signs and sounds of life, fitted it for the solemn use to which it was assigned; and those long dark passages, and lofty chambers, on whose walls we see the awful pictures and the rewards of the good, fitly unveil the most secret mysteries of the Egyptian religion.

Not far south of Thebes, on the western bank, is the large village of Arment, the old Hermonthis, where stands a picturesque temple built by Cleopatra. It has two courts with colonnades, and three chambers around which was also a colonnade, of which but one column now stands. It is of small dimensions, having been the "Typhonium" attached to the great temple of Mentu, the divinity of the place, which has been razed. On the other bank of the river, a little higher, at Tod, anciently Tophium, is a small Ptolemaic temple. Not far beyond, and about 20 miles above Thebes, by the course of the stream, are the "Gebelein," or "Two Mountains," on the western side of the river, where the sandstone begins. The town of Isi, the ancient Sene, called by the Greeks Elkopiopolis, is likewise situated on the west bank, about twelve miles higher, and is remarkable as containing a very fine Egyptian monument, the portico of its great temple of Nephe. This is in the heart of the modern town, and was much choked with rubbish until cleared by Mehemet Ali. It is supported by twenty-four lofty and massive columns, six in front, and four deep, having capitals of various forms, of which those alone in corresponding positions on opposite sides are of the same description, a deviation from regularity of which we do not see examples previous to the Greek rule. The columns and walls are covered with minute sculptures of the bad style of the period when the portico was erected.

—that of the Cessarn. It contains the hieroglyphic names of Claudius, Vespasian, Titus, and other emperors as late as Severus. The back is, however, more ancient, for it bears the name of Ptolemy Philometer, being the front of the older temple of which nothing more is known for certain to remain. Upon the ceiling is a zodiac, from which this monument was supposed to have been of very great antiquity before the interpretation of hieroglyphics had been discovered. On the other bank of the Nile, on the "site of Contra Latopolis, is a small temple of the Ptolemaic and Roman periods.

A few miles above Lins, where both the Libyan and Arabian chains approach the river, are the curious remains of Elathalia (so written in Egyptian geography). There is a small temple of the Ptolemaic time, and two little sacred edifices of the period of the Pharaohs, but the most interesting monuments are the tombs and the fort. The former, which are excavated in a hill, are very remark-
able as illustrating history as well as everyday life, husbandry, &c; and in one of them is the very curious inscription of its occupant Ahmes, chief of the masons, recording his services to early kings of Dynasty XVIII.

The fort as a large inclosure of crude-brick, 1 which was a place of importance as early as the Shepherd war, for it is mentioned as the "Fort of Suben," that is of Eileithyas, is a part of the inscription above mentioned, relating to the time of that war. The goddess of the place was Suben or Lucna (Eileithya), who was especially regarded as the protector of Upper Egypt.

Having proceeded about twelve miles to the southwest we reach the large village of Adfou or Edfin, which represents the town called by the Greeks Apollonopolis Magna, the great temple of which yet stands in a comparatively perfect state, and is one of the most stately monuments of ancient Egypt, although at a time at which it had greatly declined. It was dedicated to Har-hut, the god of the Greeks called Agathodremon. Mounds of rubbish around it, as well as the huts of the village, injured its effect, until it was lately cleared by M. Manette.

The great propylon which forms the front of the temple measures about 226 feet in width, and is, like the rest of the edifice, in a good state of preservation. The sculpture upon its face represents acts of worship by Ptolemy Auletes, who is portrayed slaying prisoners.

The portal between the wings of this propylon is the entrance to the temple of which the first part is a great court about 161 feet long and 140 broad, with a colonnade along its front and each side, of columns with various capitals supporting covered galleries. At the end is a portico having eighteen columns, six in front and three deep, about 82 feet broad and 46 long, measured within, beyond which are a hall and passages and other chambers, the most important of which is an isolated sanctuary. The wall of the great court is continued so as to inclose the further portion of the temple, leaving a passage around it. The sculptures show that it was begun by Ptolemy Philopator and completed at the end of the Greek monarchy, though an insignificant additional subject was added by Claudius.

Not far from the great temple is a smaller one of the sort called Typhonion, containing two chambers, around which runs a gallery supported by Typhonian columns.

The most interesting of the excavations is a rock temple in which is preserved the defeat of a negro nation by King Har-em-heb, or Horus, of Dynasty XVIII., here, also, are subjects depicting acts of worship paid to Nius and Sebek. To the southward of this, and also facing the river, is the entrance of an ancient temple, the representations in which are not of a remarkable character. Beyond these are three chapels of the time of Dynasty XIX. On the opposite side are very important quarries, where much of the material of the great temples was cut, especially under the Eighteenth and subsequent Dynasties.

Beyond Gebel-es-Silulah, although the mountains recede, the tract of cultivated land is extremely narrow, and sometimes the desert touches the river: this is partly owing to the sinking of the level of the stream, which, as already mentioned, was very anciently restrained by some barrier at Siluna. About eleven miles above that place is the extremely picturesque temple of Ombos, placed on a rocky eminence called "Kom-Imbou," "the Hill of Umboon," it stands within a great inclosure of crude-brick walls, which we see on every side, except that towards the river. There is a portal in this wall of the time of Queen Hatshepsut and Thothmes III. The great temple is double, one-half having been dedicated to the worship of Sebek, and the other to that of Har-oer, or Arussa. It consists of a portico of fifteen columns, of which two have fallen, the foremost being connected by a wall of intercolumniation having two entrances, and behind, there is a smaller portico and remains of chambers, including the two sanctuaries.

The earliest name here is that of Ptolemy Philometor (Modern Egypt and Thebes, ii. 282), unless Champollion be right in saying that the name of Epiphanes is also found in the temple (Lettres, 173), and it appears to have been completed by Ptolemy Auletes. There were also remains here of a smaller Ptolemaic temple which have been washed away by the river.

Nothing remarkable occurs between Ombos and Syene, a distance of about twenty miles. The valley is confined to a very narrow space by the mountains, which take bold forms on both sides near the latter place. Just before we reach it, we see the island of Elephantine, where is the famous Nilometer of the Roman time. The town of Aswan, which represents the ancient Syene, stands amid palm-trees on the eastern bank opposite to Elephantine. It is a considerable place, of greater political than of industrial importance, and has succeeded to an older town of the same name, the ruins of which occupy the river's bank and a granite hill to the south. Among them may be mentioned a pier, which has a well, most probably the Nilometer constructed by Amr, the Moslem conqueror of Egypt. In the ruined town is also a small temple of Roman date. Further to the south is its extensive Arab cemetery, which is full of curious tombstones bearing inscriptions in Cufic characters. In the grante hills to the eastward are the quarries whence were taken the obelisks and very many of the statues which adorned the Egyptian temples.

The bed of the river above Aswan is obstructed by numerous rocks and islands of granite, one of the latter of which, that of Saheyi, is interesting on account of the numerous hieroglyphic tablets and inscriptions on these islands.

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place of Osiris. On the east side is a small but very picturesque temple, nowhypothetical, of the Greek and Roman times, and unfinished. It is 45 feet in width and 63 in length, and has 14 columns with capitals of various forms, connected by intercolumnial walls. The great temple of Isis stands to the westward of this. Its front is formed by a propylon, before which is a kind of court, to be afterwards described. The portal bears the name of Nectanebo II., and the wings were added by the Ptolemies, making the entire width about 122 feet. Through the portal we enter a court, on the right side of which is a gallery fronted by columns, behind which are several small chambers, and on the left side is a separate small temple of Athor, the main entrance to which is by a door and passage in the left wing of the great propylon. This small temple begins with a portico having four columns with the faces of Athor sculptured in high relief upon each of their sides above the capitals. Beyond this are three chambers behind one another, above the door of the first of which is a Greek dedication by Ptolemy Euergetes II., and the second propylon of smaller dimensions is that of Isis, is a temple of the Natron Lakes to the westward of the Roman, and the granite quarries of Gebel-el-Fatehreh. Considerably more to the south, at El-Hammâmis, on the old way from Coptos by Philæ to Portus, are the Breccia Verde quarries, which were much worked from very early times, and have interesting hieroglyphic inscriptions. At Gebel Zâbrâra are emerald mines, now abandoned as unproductive. At the various mines, and on the routes to them and to the Red Sea, are some small temples and stations, ranging from the Pharaonic to the Roman period. Along the shore of the sea are the sites of several ancient ports, the most important of which were Myos Hormos and Berenice, and also the modern town of El-Kuseyr. The northern part of this desert is occupied by the Maâkaâ Arabs and smaller tribes as far as the El-Kuseyr road, beyond which are the Bedouins, a tribe very different from the Arabs in appearance; and to the south of these, to the east of Lower Nubia, is the Bishârî tribe, a people also of African race.

Statistics. 1

[In Egypt, as has been well said, D'État c'est le Khédive. So far as the country itself is concerned the khedive is its personal, absolute, and independent sovereign; but his relations with the Porte are somewhat less simple. When Selim I. of Turkey conquered Egypt in the beginning of the 16th century, the Mameluk power was still too strong for complete subjection, and Selim was obliged to allow his new subjects liberal terms. Egypt still retained practical autonomy, the government being in the hands of a council of Mameluk beys, presided over by a pasha, whose duty it was to look to the annual tribute paid to the Porte, but who possessed little or no actual power. This system was continued till the French occupation, and was re-established when the English army evacuated the country. The Mameluks were still the virtual governors of Egypt, until their massacre by Mehemet Ali. The ambitious designs of this pasha opened the eyes of the Porte to the dangers incurred by so lax a control of a governor unshackled by the council of beys. Menaced with the loss of Syria as well as Egypt, the cause of the sultan was espoused by four of the Great Powers; and the Treaty of 1840, confirmed by the Convention of 1841 limited Mehemet Ali's power to the vice-royalty of Egypt, hereditary for the eldest male of his family, ordered the continuation of the customary tribute, restricted the military and naval strength of the viceroy, and imposed certain other conditions, thus reducing Egypt once more to the state of a Turkish province. But in the reign of the present ruler a change has taken place in the relations between the sultan and his viceroy. A series of expensive negotiations with the Porte, ending with the raising of the tribute from £375,000 to £675,000, procured for Ismail Pasha the title of Khedive, and the right of succession from father to son. The limitation of the Egyptian army

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1 For much of the information contained in the present section, the writer is indebted to the industrious work of Mr J. G. M'Coon, Egypt in 1840, etc.; though he has thought it necessary to check it with official reports and other authorities, but it must always be remembered that Egyptian like all Oriental statistics can be accepted only with reserve.
and other restrictions which still remained were removed in 1872 by another firman, confirming all the rights previously granted, and giving the khedive every substantial attribute of sovereignty, except only the pasha legatums. The khedive is therefore virtually an independent sovereign, holding his power on the easy tenure of tribute and military aid in case of war.

The real work of governing is entirely performed by the pasha legatums, the agents, not the rulers, of the khedive. The Privy Council, presided over by the Prince Hereditary Mehemet Tawfik Pasha, and consisting of the ministers, the Sheykh al-Islam, and some other functionaries, examines and reports to the khedive on the work of the several departments. The eight ministries are those of (1) Finance, (2) Foreign Affairs, (3) Interior, (4) War, (5) Marine, (6) Commerce, (7) Public Works and Agriculture, and (8) Public Instruction. Besides these there are the sub-departments of the Customs and Post-Office.

The provincial administration (exclusive of the separate governments of the eight “cities”) is divided among the muhirs of the fourteen prefectures, the Feiyoom now being one, each subdivided into departments and communes, or cantons including several villages, governed by ma-moors, nárs, or sheyks, el-beled, appointed by the Government and assisted and checked by councils of agriculture and an administrative council for each canton.

In 1867 the Assembly of Notables was revived, consisting of village sheyks, do, elected by the communes and meeting once a year to receive from the Privy Council a report of the twelvemonth's administration. Although the Assembly has not yet attained to the full dignity of parliamentary power, it has considerable weight in the control of state measures.

By the Convention of 1841 the Egyptian army was limited to 18,000 men, but this was raised to 30,000 by the firman of 1866, and now all restrictions have been done away. The present force may be placed at an average peace strength of 30,000 men, regulated, however, on a short service system, so that not more than half this number are generally at one time with the colours. This army consists of 18 regiments of infantry, 3 battalions each; 4 battalions of riflemen; 4 regiments of cavalry, 6 squadrons each; 4 of field artillery, 6 batteries each (2 mounted), 3 of garrison artillery; and 3 battalions of pioneers. The infantry are armed with the Remington rifle; the cavalry with revolver and lance, or sabre and carbine; the field artillery with 100 Krupp guns and 50 smooth-bore. Besides these there is a reserve of 30,000 men, and an irregular contingent of 60,000 mounted Bedawees. The army is raised by conscription, irregular forces being held every two or three years. All Egyptians of any creed are liable to conscription, except only the inhabitants of Cairo and Alexandria; but immunity may be purchased by payment of a tax. The monthly pay ranges from 20 piastres (= 4s. 2d.) for a private, to £5 (Egyptian) for a captain, £40 for a full colonel, and £75 for a field general. Under the training of French and American officers, the army has been brought into an admirable state of discipline and efficiency.

The Egyptian navy hardly deserves notice. It consists at present of 3 frigates, 2 corvettes, 4 gunboats, and 2 sloops, all unarmed.

Mehemet Ali devoted considerable attention to the establishment of colleges and military schools, besides sending young men to Europe for purposes of scientific study. In Cairo and its environs he founded several elements of the system of educational arrangements, as schools of a higher order than the native schools of the same class; a school of languages; a printing press at Boolak, from which many valuable publications have issued, and a school of medicine at Kasr-el-Eynee, between Cairo and Maar-el-Ateekah, which has done excellent work. At El-Khankah and in its neighbourhood he placed a military hospital, a school of medicine, a veterinary college, an agricultural school, and a school of music, at El-Geezeh a cavalry school, and at Turá one of artillery. These and similar establishments were well designed and ably carried out. When Mehemet Ali's ambitious designs were defeated in 1840 by the action of the Powers, his educational reforms languished, and under Abbas the schools were closed and everything returned to the old system. Said Pasha endeavoured to revive Mehemet Ali's improvements, but it was reserved for the present khedive entirely to carry out his grandfather's designs. Besides the revived and newly created military schools, there are two systems of education in Egypt—by the schools established and supported by the Government, and by the old system of mosque educator and Arab primary schools, besides the numerous establishments of the non-Muslim communities. The Government schools are nine in number—the Polytechnic, Book-keeping and Surveying, Law and Languages, Industrial, Medical, Midwifery, two preparatory schools at Cairo, and one at Alexandria. Besides these the Government supports a school for the blind, a normal school, two girls' schools, three industrial schools, and 23 municipal schools. At the Polytechnic School the course extends over six years, and includes the higher mathematics, chemistry, physics, geology, mechanics, geography, history, drawing, Arabic, and English or French.

Of the mosque colleges, the greatest, not only in Egypt but in the whole Mohammedan world, is the Azhar, where over 11,000 students, coming from every quarter of the Muslim empire, are instructed by 330 sheyks in the old curriculum of Muslim acquirement. The Arab primary schools, 4000 or 5000 in number, are the regular providers of education for the fellaheen, who pay either nothing at all, or a merely nominal sum, for being taught to read and recite the Koran, and sometimes writing and very elementary arithmetic. How greatly the educational system in Egypt has been enlarged of late may be judged from the fact that, under Said Pasha it hardly cost the Government £4000 a year, whilst the educational budget (exclusive of the military schools) now reaches the sum of £40,000, to which the khedive adds £12,500, making a total of £52,500.

Of the schools of non-Muslim communities the Copts have 16, the Greeks 4, the Armenians 1, and the Jews several academies. Besides these there are two undenominational “Universal Schools,” of foreign foundation, where a moderate education, without religious instruction of any kind, is given to all comers, and many schools founded by the American Board of Missions, and Miss Whately's admirable British Mission School. The proportion of girls' schools is extremely small, but their existence, and the fact that they receive the warmest support of one of the waves of the khedive, is a hopeful sign.

The public works carried out in Egypt during the present reign would fill a long catalogue, without reckoning the Suez Canal, for an account of which see CANAL, vol. IV. p. 789. Railway communication has been established between Alexandria, Cairo, Damietta, the Feeyoom, and Aasytou, the various lines covering over 1200 miles. A Soudan railway, from Wadcc Halieh to Hannek, and from near Dunkallah to Khartoom, involving costly and difficult engineering for a length of more than 1000 miles, has been begun with the view of intrusting the passage to India, and bringing the produce of the rich southern soil into easier connection with Cairo; these works are, however, at present at a standstill. The canal
system has been greatly enlarged and improved, but a still better result is anticipated from the barrage of the Nile, a plan projected by M. Mougel and now about to be carried out for the khedive by Mr. Fowler. In 1871 the work of building a breakwater to defend the New Harbour at Alexandria from the sea caused by the constant south-west winds was begun. The outer breakwater extends above two miles across the mouth of the harbour, inclosing an area of 1400 acres of calm water. The structure rises 7 feet above the highest sea-level, and is of a uniform width of 20 feet. Harbour works have also been constructed at Suez. At a cost of over £160,000, four large light-houses have been erected, seven on the Mediterranean coast, seven on the Red Sea, whereas at the beginning of the reign of the khedive there was but one. Telegraph lines (begun by the enterprise of Said), have been set throughout Egypt, covering nearly 6000 miles, and putting Alexandria into direct communication with Kartoum; and thus branch of the public service is managed by English officials. Submarine telegraphs also bring Egypt into communication with Candia and thence with Constantinople and Otranto, and with Malta thence with England, France, &c. The post-office was bought by the Government in 1863, and under the management of an English post official has been greatly improved. In about 70 towns and villages offices have been established, and several mails a day are despatched from the chief places.

The manufactures of Egypt have been in a declining state for several centuries. Mehemet Ali tried to promote them, by establishing large manufactories of cotton, silk, and woollen goods, turabooshes, &c., and, especially in Upper Egypt, sugar-refineries. Ibrahim Pasha was much opposed to his father's policy, and in pursuance of his own views he laid out extensive plantations of olive and other trees, erected powerful steam-engines for the irrigation of his lands, and on all his estates endeavoured to encourage agriculture. It cannot be doubted that had he lived the correctness of his conviction that Egypt is an agricultural, not a manufacturing, country would under his rule have been fully verified. Mehemet Ali introduced cotton and largely cultivated it; the Turkish grandees found that from it they could extract more gain than from other field produce, and large tracts were speedily devoted to its culture. The necessity, however, of excluding the waters of the Nile has caused several destructive inundations; and so long as the cotton growth remained a monopoly of the pasha it was no means of enrichment to the producer. Now, however, that the monopoly is abolished, the trade in cotton is greatly increasing, and this produce will undoubtedly become every year a more important item in the wealth of the country. The old restrictions upon agriculture have been more or less done away; and the Government, whilst not wholly abandoning Mehemet Ali's views on manufactures, is yet alive to the paramount importance of affording every encouragement to agriculture.

The cotton crop in 1875 extended over 871,847 feddans (≈ acres, nearly) and produced 2,815,841 quintals (≈ 110lbs. of grain) of graded staple, 1,654,555 ardebbs (of 5 kussas each) of seed, and 374,246 loads of cotton sticks, altogether reaching a total value of about two millions and a quarter. The wheat crop in the same year was estimated at 6,665,628 ardebbs, of the value of £1,756,058; maize (duriel), 10,105,715 ardebbs, £281,193,000; beans, 4,176,573 ardebbs, £24,575,773; barley, 3,108,085 ardebbs, £32,294,000; rice, 95,521 ardebbs, £27,289,008. The other crops of Egypt are chiefly clover, sugar-cane, flax, hemp, tobacco, henna, and indigo.

The revenue is derived chiefly from the land-tax, the tax on date-trees, trade licences, the customs, the tobacco duties, railways, and the Mukabalah (of which an account will be given), and village annuities. Of these the land-tax is the principal item, amounting to nearly half the total revenue; but this will be considerably reduced when the Mukabalah comes to an end (in 1885). The whole revenue may at present roughly be placed at £10,500,000. It is very difficult to estimate the exact amount of direct taxation on the population. One writer places it at 25a., per head per annum; whilst a recent report states that, including the Mukabalah, the annual payment of taxes has lately reached £4,444. It is certain the taxation at present exceeds the possible returns of the land, and that the fellahen are compelled to borrow money to pay the taxes. The items of expenditure may thus be roughly summarized:—

**Statistics,**

<table>
<thead>
<tr>
<th>Revenue</th>
<th>Pounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land tax</td>
<td>825,000</td>
</tr>
<tr>
<td>Tax on Date-trees</td>
<td>40,934</td>
</tr>
<tr>
<td>Licences</td>
<td>32,486</td>
</tr>
<tr>
<td>Mukabalah</td>
<td>314,688</td>
</tr>
<tr>
<td>Customs</td>
<td>124,737</td>
</tr>
<tr>
<td>Railways</td>
<td>138,207</td>
</tr>
<tr>
<td>Locks, ports, &amp;c.</td>
<td>82,913</td>
</tr>
<tr>
<td>Salt</td>
<td>56,600</td>
</tr>
<tr>
<td>Tobacco</td>
<td>51,683</td>
</tr>
<tr>
<td>Otras, various duties, &amp;c.</td>
<td>74,476</td>
</tr>
<tr>
<td>Sudan revenues</td>
<td>30,000</td>
</tr>
</tbody>
</table>

**Expenditure**

<table>
<thead>
<tr>
<th>Pounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tribute to Constantinople</td>
</tr>
<tr>
<td>Civil list of the Khedive</td>
</tr>
<tr>
<td>Allowance to the Prince Héritier</td>
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<tr>
<td>Allowance to Halim Pasha</td>
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<tr>
<td>Appointments of the Cabinet Ministers, &amp;c.</td>
</tr>
<tr>
<td>Various pensions and other expenditure</td>
</tr>
<tr>
<td>Council of State, Court of Appeal, Court of First Instance at Cairo, &amp; Chamber of Notaries</td>
</tr>
<tr>
<td>Irregular troops</td>
</tr>
<tr>
<td>Egyptian Museum, Ismailia Canal, Archives, Provisions, Stores, &amp;c.</td>
</tr>
<tr>
<td>Customs</td>
</tr>
<tr>
<td>Foreign Agents</td>
</tr>
<tr>
<td>Appointments and expenses of the Provinces of Upper and Lower Egypt</td>
</tr>
<tr>
<td>Appointments and expenses of Cairo, Alexandria, Dametta, Rosetta, Suez, &amp;c., with Oron</td>
</tr>
<tr>
<td>Expenses of the Governor general</td>
</tr>
<tr>
<td>Locks, barrages, Soudan Railway, &amp;c.</td>
</tr>
<tr>
<td>Interest on Suez Canal Bonds</td>
</tr>
<tr>
<td>Interest on Suez Canal Shares</td>
</tr>
<tr>
<td>Annuités and loans (redemptions and interest)</td>
</tr>
</tbody>
</table>

During the last fifteen years Egypt has acquired the enormous national debt of about £20,393,000. The attempt to Europeanize the country has entailed a vast expenditure. Public works have been carried out at an altogether unnecessary rate of speed, and European contractors have been employed who have not scrupled to drive bargains exceedingly favourable to themselves and ruinous to the Egyptian Exchequer. To these causes of expenditure must be added the dishonesty and extravagance of the Government officials, the waste of money on works which have proved unproductive and useless, and the heavy damages given against the khedive in the extraordinary award of the late emperor Napoleon as arbitrator in the dispute with the Suez Canal Company. To meet the heavy expenses resulting from these causes, five loans have from time to time been raised.

The first was borrowed by Said Pasha in 1862, and amounted to only £3,292,600 nominal, to be repaid in thirty years, interest 7 per cent, and sinking fund 1 per cent. The present viceroy then raised the 1864 loan of £3,804,200 nominal, with interest and sinking fund at 7 and 3 per cent, redeemable in 36 years.

The next loan, of 1868, redeemable in 1898, was for £11,890,000 nominal (of which only £7,193,334 was received), with apparent interest and sinking fund at 7 and 3 per cent, really 25 and 12½ per cent, on amount received, or altogether 32 per cent.
The result was a scheme which the Right Honourable G. J. Goschen, M.P., then urged upon him with so much eloquence that the state debt was thus divided into three parts, and the three small loans, interest 7 per cent, redeemable at 80 in 100, and the three short loans, interest 5 per cent, were paid off by the Mubakalah. Besides these, there was the private Daira debt of the khedive. The scheme is perhaps the best that can be devised under the present perplexing conditions, and if the Egyptian Government can maintain its revenue and will hold to its engagements there is every probability that the debts will be paid off at the appointed times. When the Mubakalah fails in 1885 the three short loans will (presumably) have been paid off. This preference debt is to be redeemed in 55 years by the operation of a sinking fund of £35,744 a year, and the united debt in the same time and after a similar manner. With a view to insure the carrying out of these reforms, the khedive has appointed English and French controllers-general, who are instructed to collect the revenue and the appropriation of it to the purposes settled by the financial scheme. A European Commission of the Public Debt has also been appointed for receiving the revenue devoted to the payment of the debt charges, and another High Commission, composed of three Europeans and five natives, controls the railways and the port of Alexandria. So long as the present arrangement is held to, and if no unforeseen decrease takes place in the revenue, the financial position of Egypt may be considered hopeful. The khedive has been the subject of much censure at the hands of his bondholders. It must however be remembered that he received but half of the sums supposed to have reached him. Of the £45,000,000 received he has paid back over £30,000,000 in interest, &c., and £10,000,000 went in the Suez Canal indemnity, so that only £4,000,000 could have been squandered. That the khedive is no financier is obvious, but he seems honestly determined to pay his debts, and if there was any ulterior motive in the matter of the loans it was not on the khedive's side.

The principal exports from Egypt are cotton, cereals, and sugar. In 1875, 153,912,536 lb. of raw cotton was exported to Great Britain, at the value of £6,685,340, and the total cotton export is estimated at over two millions and a half of quintals. Of beans, 480,357 arsebs were exported in 1875, of which, 326,912 were barley, 98,666 quintals. Mace, barley, flax, cotton, dates, hemp, and other produce form less important items in the list of exports. The total value of exports is estimated at between twelve and thirteen million pounds. The imports are estimated at about five millions and a half of pounds and consist chiefly of manufactured goods, coal, oil, wine, machinery, &c. Of the whole commerce about 25 per cent is with Great Britain. There is also a considerable transit trade, which, however, has necessarily diminished since the opening of the Suez Canal.

The Egyptian measures are— the foot, or space measured by the extension of the thumb and first finger; the cubit, or span; and the cubit (of three kinds, — 22 in, 25, and 26½ inches). The measure of land is the feddan, very nearly equal to the English acre, subdivided into 24 khebets, and each of these into 330 (formerly 3334) kashebs, or rods, the kasheb being a square measure with sides of 22 khebets, each equaling 6½ inches. The ardeb is equal to about 5 bushels, and is divided into 6 weybehs, and each weybeh into 24 rubas.

The weights are these:—

64 krombahs (or gruas of wheat), or 48 habbehs (or gruas of barley) = 1 durbah (= 4½ s 'Troy').
12 durbahs = 1 wukeh or vaceh (about 575 gr.)
12 wukeh ors = 1 ratl or pound (= 15 oz. 13 dr. avoirdupois.)
210 ratls = 1 wukkah or oke (= 22 lb.)
36 wukkahs = 1 kantar or quart (= 16 lb.)
24 keebas = 1 mithkal or weight of a demir (= 72 gr.)

The French metrical system has been established by the khedive, but it has not yet been generally adopted.

The standard unit of currency is the kharsh, or piastre (about 25 c.,) which is coined in gold pieces of 5, 10, 20, 25, 50, 100 piastres : silver of 1, 2½, 5, 10, 20 piastres.
Copper coins of 5, 10, 20 para (or faddals, 40 to the piastre) and 1 piastre are also coined. The kee, or para, of 800 piastres, is equal to about £4, 2s. 6d. The khamze, or treasury, consists of 1000 para. 97½ piastres are given for the English pound sterling. Besides the regular Egyptian currency, European coins of all kinds are commonly employed in Egypt, especially the English sovereign, the French Napoleon, the Venetian sequin, the Spanish doubloon and dollar, the 5-franc piece, and the Constantine coin.

INDEX TO ARTICLE EGYPT.

EHRBREITSTEIN, a small town in Prussia, in the circle of Coblenz, situated on the right bank of the Rhine, and connected with the town of Coblenz by a bridge of boats, is of importance as possessing a magnificent fortress erected upon a precipitous rock 401 feet above the boa.ts, is of importance as possessing a magnificent fortress.

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Scientific Society of Göttingen, and in 1819 Oeheimer Justizrat of Hanover. His health was shattered by an attack of inflammation of the lungs in the year 1819, but he regularly continued his prelections to a large number of students until attacked by fever on the 14th June 1819. He died on the 27th of that month. Eichhorn is the author of a good many historical works, but it is as a biblical critic that he is best known. He may almost be said to have originated the science of biblical criticism, for he first properly recognized its scope and the problems it had to solve, and began many of its most important discussions. He was the first to see the necessity of finding a firm historical foundation for everything in Christianity that was to be accepted as fact. Preliminary to his endeavours towards this end, he took for granted that all the so-called supernatural facts relating to the Old and New Testaments were explicable on natural principles. 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both Icelanders and Norwegians. In the Old World the Eider breeds in suitable localities from Spitsbergen to the Parn Island, and the coast of Jutland—where it is known as St Catherines Duck. Its food consists of marine animals (mollusks and crustaceans), and hence the young are not easily reared in captivity. The Eider of the New World differs somewhat from our own, and has been described as a distinct species (S. drasseri), one of which (the latter) also inhabits the Arctic coast of Russia and East Finnmark and has twice reached England. The Labrador Duck (S. labradorica), which is now believed to be extinct (see Brans, vol. iii. p. 735), also belongs to this group. (A. N.)

EILENBERG, a town in the province of Saxony, government of Meissen, circle of Delitzsch, is situated on an island formed by the Mulde, about 29 miles north-east of Leipzig. The principal structures are the hospital, the infirmary, three churches, and the castle. From the last-mentioned, formerly known as Ilberg, and in the time of Henry the Fowler an important post of defence against the Sorbs and Wends, the town received its name. The industries include the manufacture of chemicals, cloth, quilting, calico, cigars, and agricultural implements, bleaching, dyeing, wax-refining, brick-making, and trade in cattle. In the neighbourhood is the iron-foundry of Finster.

ELLENBURG, a town in the west circle of the duchy of Saxo-Altenburg, in the province of Hainichen, government of Meissen, circle of Delitzsch, is situated on the Horsel, 39 miles north-east of Leipzig. The principal structures are a cathedral, a castle, the town-hall, hospitals, and a town-house, erected in 1641. Elsenach has a manufactory for cotton cloth, and a large woollen and several other mills. Population in 1875, 16,133.

ELSENACH, a town in the west circle of the duchy of Saxo-Altenburg, and 24 miles W.S.W. of Altenburg. It is old, and has changed possessors more than once, but was joined to Saxo-Altenburg in 1826. It possesses an old castle and a beautiful church. Its industries are principally woollen and porcelain manufactures, linen-weaving, and shoe-making. Population in 1875, 5,509.

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ELEICHA, the capital of the Eisenach circle and of the administrative department of Saxe-Weimar-Eisenach, lies in a romantic district at the north-west end of the Thuringian wood. It is situated on the Horsel, at the junction of the Thuringian and Werra railways, and 44 miles west from Weimar. In its neighbourhood is the Warburg, where Luther on his return from the Diet of Worms was imprisoned, and where from May 1521 to March 1522 he devoted himself to the translation of the Bible. On a high rock on the south side of the town are the ruins of the castle of Madelstein. Eisenach is the birth-place of Sebastian Bach, and he and Luther were educated at its gymnasium, then the Latin school. Among the public buildings may be mentioned the tower of St Nicholas, the castle; rebuilt in 1742, and the town-house, erected in 1641. Eisenach has a manufactory for cotton cloth, and a large woollen and several other mills. Population in 1875, 16,133.

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EISLEBEN (Latin, Isleba), the chief town of the Mansfield circle, in the government of Merseburg, province of Saxony, Prussia, is situated on the railway from Halle to Nordhausen and Cassel, 15 miles west from Halle. It consists of an old and a new town, the former being surrounded by walls. In the vicinity are extensive copper and silver mines, and the town itself possesses smelting furnaces, several breweries, and manufactories of linen, tobacco, and woollen.

Among its principal buildings are—the old castle, the church of St Andrews, which contains numerous monuments of the counts of Mansfield, the church of St Paul and St Peter, in which is the font where Luther was baptized; the Royal Gymnasium, founded by Luther shortly before his death in 1546, and the hospital. Eisleben is celebrated as the place where Luther was born and died. The house in which he was born was burned in 1689, but was rebuilt in 1693 as a free school for orphans; that in which he died has lately been renovated, and his death-chamber is still preserved.

The first mention of Eisleben dates from the 11th century. During the insurrection of the peasants in 1525, it was partly destroyed, and it was immediately after this that the new town was founded. In 1788, when the township of Mansfield House was extinct, Eisleben came into the possession of Saxony, and in 1815 of Prussia. The population in 1875 was 14,378.

EISTEDDFOD, Yn (plural Eisteddfodau), the national bardic congress of Wales, the objects of which are to encourage bardism and music and the general literature of the Welsh, to maintain the Welsh language and customs of the country, and to foster and cultivate a patriotic spirit amongst the people. This institution, so peculiar to Wales, is of very ancient origin. The term Eisteddfod, however, which means “a session” or “a sitting,” was probably not applied to bardic congresses before the 12th century.

The Eisteddfod in its present character appears to have originated in the time of Owain ap Maxen Wledig, who at the close of the 4th century was elected to the chief sovereignty of the Britons on the departure of the Romans. It was at this time, or soon afterwards, that the laws and usages of the Gorsedd were codified and remodelled, and its motto of “Y gwyr yn erbyn y byd” (“The truth against the world”) given to it. “Chairs” (with which the Eisteddfod as a national institution is now inseparably connected) were also established, or rather perhaps resuscitated about the same time. The chair was a kind of convention where disciples were trained, and bardic matters discussed preparatory to the great Gorsedd, each chair having a distinctive motto. There are now existing four chairs in Wales,—namely, the “royal chair of Powys,” whose motto is “A laddo a leddir” (“He that slayeth shall be slain”); that of Gwen and Glamorgan, whose motto is “Dduw a phob daimon” (“God and all goodness”); that of Dyfed, whose motto is “Calon wrth galon,” (“Heart with heart”); and that of Gwynedd, or North Wales, whose motto is “Gwen” or “O leu! ma’g gamwth” (“Jesus, or Oh Jesus! suffer not iniquity”).

The first Eisteddfod of which any account seems to have descended to us was one held on the banks of the Conway in the 6th century, under the auspices of Maelgwn Gwynedd, prince of North Wales. Maelgwn on this occasion, in order to prove the superiority of vocal song over instrumental music, as recorded to have offered a reward to such bards and minstrels as should swim over the Conway. There were several competitors, but on their arrival on the opposite shore, the harpers found themselves unable to play, owing to the injury their harps had sustained from the water, while the bards were in as good tune as ever.

Griffith ap Cynan, prince of North Wales, who had been born in Ireland, brought with him from that country many Irish musicians, who greatly improved the music of Wales. During his long reign of 56 years he offered great encouragement to bards, harpers, and minstrels, and framed a code of laws for their better regulation. He held an Eisteddfod about the beginning of the 12th century at Caerwys in Flintshire, “to which there repaired all the musicians of Wales, and some also from England and Scotland.” For many years afterwards the Eisteddfod appears to have been held triennially, and to have enforced the rigid observance of the enactments of Griffith ap Cynan. The places at which it was generally held were Aberffraw, formerly the royal seat of the princes of North Wales, Dynevor, the royal castle of the princes of South Wales, and Machynlleth, the royal palace of the princes of Powys, and in later times Caerwys in Flintshire received that honourable distinction, it having been the princey residence of Llewelyn the Last. Some of these Elbteddfodau were conducted in a style of great magnificence, under the patronage of the national princes. At Christmas 1197, Cadwgan, the son of Bleddyn ap Cynfyn, prince of Powys, held an Eisteddfod in Cardigan Castle, to which he invited the bards, harpers, and minstrels, “the best to be found in all Wales,” and “he gave them chairs and subjects of composition according to the custom of the feasts of King Arthur.” In 1175 Rhys ab Gruffydd, prince of South Wales, held an Eisteddfod in the same castle on a scale still greater magnificence, it having been proclaimed, we are told, a year before it took place, “over Wales, England, Scotland, Ireland, and many other countries.”

On the annexation of Wales to England, Edward I deemed it politic to sanction the bardic Eisteddfod by his famous statute of Rhuddlan. In the reign of Edward III for Hael, a South Wales chieftain, held one at his mansion. Another was held in 1431, with the permission of the king, by Griffith ab Nicholas at Carmarthen, in princely style, where Dafydd ab Edmund, an eminent poet, signalized himself by his wonderful powers of versification in the Welsh metres, and whence “he carried home on his shoulders the silver chair” which he had fairly won. Several Eisteddfodau were held one at least by royal mandate in the reign of Henry VII. In 1523 one was held at Caerwys before the chamberlain of North Wales and others, by virtue of a commission issued by Henry VIII. In the course of time, through relaxation of bardic discipline, the profession was assumed by unqualified persons, to the great detriment of the regular bards. Accordingly in 1567 Queen Elizabeth issued a commission for holding an Eisteddfod at Caerwys in the following year, which was duly held, when degrees were conferred on 55 candidates, including 20 harpers. From the terms of the royal proclamation we find that it was then customary to bestow “a silver harp” on the chief of the faculty of musicians, as it had been usual to reward the chief bard with “a silver chair.” This was the last Eisteddfod appointed by royal commission, but several others of some importance were held during the 16th and 17th centuries, under the patronage of the earl of Pembroke, Sir Richard Neville, and other influential persons. Amongst these the last of any particular note was one held in Bewyer Castle, Glamorgan, by Sir Richard Basset in 1681.

During the succeeding 100 years Welsh nationalty was at its lowest ebb, and no general Eisteddfod on a large scale appears to have been held until 1819. Though several
small ones were held under the auspices of the Gwynedd-digon Society, established in 1771,—the most important being those at Corwen (1769), St Asaph (1790), and Caerwy (1798). At the close of the Napoleonic wars, however, there was a general revival of Welsh nationality, and numerous Welsh literary societies were established throughout Wales, and in the principal English towns. A large Eisteddfod was held under distinguished patronage at Carmarthen in 1819, and from that time to the present day they have been held, almost without intermission, annually, several of them being held under royal patronage. The following is a list of the principal Eisteddfodau since that date:

1820, Wrexham; 1821, Carnarvon; 1822, Brecon; 1823, Carmarthen; 1824, Welshpool; 1825, Brecon; 1826, Denbigh, 1827, Beaumaris; 1828, Cardiff; 1829, Llanerchymedd; 1836, Liverpool; 1835, Merthyr; 1839, Liverpool; 1840, Aberavon; 1842, Swansea; 1845, Aberavon; 1849, Aberpenna; 1850, Rhuddlan; 1851, Tremadoc; 1852, Liverpool and Pembroke; 1854, Festiniog; 1855, Dyne Fawrddyr, Machynlleth, and Morriston, 1858, Llangollen (memorable for the ancient ceremonies and restoration of the ancient bardic traditions, bardic, bardoc), 1859, Meirion, 1859, Denbigh, 1860, Denbigh; 1861, Conway and Aberdare, 1862, Carnarvon; 1863, Swanses and Rhyl, 1864, Llandscnnt, 1865, Aberystwith; 1867, Chester; 1868, Carnarvon; 1869, Rhos; 1870, Llanerchymedd; 1870, Rhyl, 1871, Towyn; 1872, Pembroke; 1873, Mold; 1874, Bangor; 1875, Pwllhele, 1876, Wrexham; and 1877, Carnarvon.

Besides these, innumerable local Eisteddfodau have been held during the last 50 years. To constitute a provincial Eisteddfod it is necessary that it should be proclaimed by a graduated bard of a Gorsedd a year and a day before it takes place. A Gorsedd is a corporation about the beginning of the reign of Edward III, as a remedy to a lessee who for years had been ousted of his term. It was a writ of trespass, and 'carried damages, but in course of time the courts of common law added thereto 'a species of remedy neither warranted by the original writ nor demanded by the declaration, viz., a judgment to recover the term and a writ of possession upon.' The next step was to extend the remedy to cases of disputed title to freehold. This was done indirectly by the claimant entering on the land and there making a lease for a term of years to another person; for it was only a term that could be recovered by the action, and to create a term required actual possession in the grantor. The lease remained on the land, and the next person who entered even by chance was accounted a tenant, which was the title, and then served upon him a writ of trespass and ejectment. The case then went to trial as on a common action of trespass; and the claimant's title, being the real foundation of the lessee's right, was thus indirectly determined. These proceedings might take place without the knowledge of the person in possession; and to prevent the abuse of the action a rule was laid down that the plaintiff in ejectment must give notice to the party in possession, who might then come in and defend the action. When the action came into general use as a mode of trying the title to freehold, the actual entry, lease, and ouster which were necessary to found the action were attended with much inconvenience, and accordingly Lord Chief-Justice Rolle during the Protectorate substituted for them the fictitious averments already described. The action of ejectment is now only a curiosity of legal history. Its fictitious suitors were swept away by the Common Law Procedure Act of 1852. A form of writ was prescribed, in which the person in possession of the disputed premises by name and all persons entitled to defend the possession were informed that the plaintiff claimed the disputed property, and as the plaintiff was required to appear in court to defend the possession of the property or such part of it as they should think fit. In the form of the writ and in some other respects ejectment still differed from other actions. But now by the Judicature
Act, 1875, all actions are begun and carried on in the same manner, and an action for the recovery of land will, with very few exceptions, proceed in the same manner as any other action.

EKATERINBURG, or YEKATERNBURG, a town of Asiatic Russia, at the head of a department in the province of Perm, on the Siberian highway, about 238 miles to the south-east of Perm, in 56° 49' N. lat. and 60° 35' E. long. It is situated near the eastern skirt of the Ural Mountains, and occupies both banks of the Iset, which is there crossed by a dam and forms a valuable reservoir for industrial purposes. In 1834 it was made the seat of a suffragan bishop, and it has long been the head-quarters of the administration of the mines, not only for the immediate neighbourhood, but also for the big-gazol, Goroblaggodat, Perm, Zlatoostoff, and Kaban-Votkins districts. The streets are broad and regular, and several of the houses of patanal proportions. There are two cathedrals—St Catherine’s founded in 1785, and Epiphany in 1774, with more than a dozen churches and a monastery, two gymnasiunm, a departmental school, a city infirmary, a workmen’s hospital, an almshouse, a children’s home, a prison, a theatre, and a museum opened in 1853. Besides the Government mint for copper coinage, which dates from 1735, the Government engineering works, and the imperial factory for the polishing of malachite, jasper, marble, porphyry, and other ornamental stones, the industrial establishments comprise tallow-factories, soap-works, glue-works, rope-works, distilleries, potteries, and carriage factories. The trade is very extensive, especially in cattle, grain, iron, woolen and silk stuffs, and colonial wares; and besides a weekly market there are two annual fairs. The population in 1866 numbered 19,832, mostly belonging to the Greek Church, only 47 being Catholics, 198 Protestants, and 36 Mahometans, in 1871 it had increased to 25,323.

Ekaterinburg took its origin from the mining establishments founded on the spot by Peter I. in 1723, and received its name in honour of Catherine I. Its development was greatly promoted in 1763 by the Siberian highway, which till then had passed by Verkhnetobolsk, being diverted so as to pass through it; and the gradual extension of mining operations in the district has maintained its prosperity. In 1781 the town was transferred from the Tobolsk department to the government of Perm, and in 1833 passed from the jurisdiction of the Administration of Mines to the ordinary civil jurisdiction.

EKATERINODAR, the chief town of the Russian government of Kuban, on the right bank of the Kuban, near the confluence of the Karsau, in 45° 3' N. lat. and 35° 14' E. long, 1400 miles from St Petersburg and 555 miles north west of Tiflis. It is badly built on a swampy site exposed to the inundations of the river; and its houses, with few exceptions, are slight structures of wood and plaster. Six churches, a gymnasium, two schools, and a hospital are the principal public buildings. None of the industrial establishments, which comprise soap-works, tanneries, brick-works, and potteries, are of more than local importance; but there is a fair trade in horses, cattle, sheep, wool, and fish. In the neighbourhood is a large garden and orchard maintained by the Government for the encouragement of horticulture. The town dates from the reign of Catherine II., when in 1792 the Zaporogian Cossacks were transferred to the Kuban district. In 1860 the population amounted to 9620, mainly Cossacks; in 1871 it was 17,622.

EKATERNOSLOFF, or EKATERNOSLAVSKAYA GUBERNIA, a government of Southern Russia, which lies partly to the W. of the Don, stretches E. to the Donetz and the Kalmius, and in the S. reaches the Sea of Azoff between the mouths of the Berda and the Kalmius. It is watered by the Donieper for 200 miles, and bounded by the Donetz for 192. The district of Rostoff, lying round the head of the Gulf of Taganrog, though naturally a portion of the Country of the Don, is also assigned to Ekaternosloff. According to the military survey, the area of the government is 26,055 square miles, or 59,185 square versts; according to Schweizer, only 25,644 square miles, or 58,538 square versts. Its area is a steppe-like plain, relieved here and there by considerable elevations, and traversed by deep ravines and river courses. The most important range of hills, or those forming the water-shed between the tributaries of the Donetz and the independent affluents of the Sea of Azoff, attains no greater height than 530 feet above sea-level. A line drawn from near the mouth of the Orel parallel with the Dnieper as far as the town of Ekaternoslof, and thence to the village of Karakob on the Kalmius, divides the government into two geographical districts, of which the south-western is distinguished by crystalline and the north-eastern by sedimentary rocks.

Of the former the predominant variety is gneiss, interrupted by numerous upheavals of granite, syenite, diorite, and serpentine. The latter belong to several different formations. Carboniferous strata occupy the greater part of the districts of Slavianoosorsk and Bakhmout and part of Pavlograd and Alexandrof; Permian strata occur within a very limited area in Bakhmout. Cretaceous strata form a narrow strip along the northern boundary of the government from Bakhmout to the confluence of the Orelka and the Orel, and Tertiary strata extend through nearly all the district of Novomoskovsk and the southern part of Pavlograd. The mineral deposits of the government are of great value. Anthracite and coal are distributed along the northern Donetz, the Logun, the Miuschik, the Kalmius, and various other streams. The quantity of coal obtained in 1861 exceeded 1,200,100 puds. Iron ore is present in the same districts, and is successfully worked in several places, as at the Government establishments on the Logun. Excellent whetstone is procured in the Slaviansoorsk district, and transported throughout Russia. Asbestos, millstones, gypsum, marl, and rock salt, as well as building materials, are among the minor products. There are altogether about 200 lakes in the government, the largest, which is called the Solzian Liman or Salt Lagoon, though the water is brackish for an area of nearly three square miles; and next in size is the Temenitza lake near Rostoff. The soil is for the most part very fertile, and agriculture is the principal occupation. Wheat is the staple cereal, and forms an important article of export; but rye, barley, and millet are cultivated for local consumption and distillation. Since about 1850 the culture of flax has attained considerable importance; wild rye-seed is also exported, and in small quantities hemp and the sunflower are grown. The aloe thorn is very abundant, and the fruit is manufactured into a wine called Terevka. The German colonists of Khoritz and Alexandrovia and the Greeks of Marupol cultivate tobacco—the former principally a poor American variety for local consumption, the latter Turkish for export. Potatoes are grown only in gardens, as to plant them in the fields is regarded as prejudicial. Horticulture is poorly developed, but there are beautiful public gardens at Taganrog and Ekaterinodar, the Petrofisky park in the former city being also the oldest in the government. About 7,200,000 acres, or 46 per cent. of the territory of the government, is devoted to pasturage, and in 1861 there were 2,670,000 sheep, 730,000 neat, 200,000 horses. Only about two per cent. of the surface is occupied by wood, and even that is almost exclusively confined to the river courses, especially of the Samara and the Donetz. The trees are almost exclusively deciduous, oak being dominating, and elm, larch, black poplar, poplar, and aspen occurring.

VII. — 100
In 1860 the total population was 1,138,749, and in 1897, 1,281,482. At the former date there were about 26,000 Greeks, more than 30,000 Germans, 19,000 Russians, 9,000 Mahometans, 9,000 Davaras and Wallachians, 7,000 Poles, 7,000 Luthe­ranans, 500 Servians, and 500 Gipsies; while the Little Jews and the different sects stood to each other in the ratio of 23 to 17. Upwards of 5500 were Russian dissenters or Easkolins, 20,318 Protestants, and 7049 Catholics. Two cities only, Rostov on Don and Kadikoy, had upwards of 10,000; and several, such as Novorossiokof, Pavlograd, Murapol, and Anzef, had more than 5000.

EKATERINOSLAFF, a town of European Russia, capital of the above government, is situated on the right bank of the Dniester, at a height of 210 feet above the sea, 394 miles from St Petersburg and 600 from Moscow, in 49° 21' N. lat. and 34° 4' E. long. If the suburb of Novi Koundak, be included, it extends for upwards of four miles along the river, and its average breadth is about 1/4 miles. The oldest part lies very low, and is consequently much exposed to floods. Contiguous to the town on the north-west is the royal village of Novi Madzin or the New Factories, and in the south-east, Kazanay Madziekova. Only about 200 houses are built of stone. The bishop's palace, eight churches, a Raskolnik place of worship, a syna­agogue and four Jewish oratories, a gymnasium, a library, and several benevolent institutions, make up the list of the public buildings. The house now occupied by the Noble's Club was formerly occupied by Potemkin. Among the industrial establishments are brickworks, foundries, flour-mills, and numerous tallow-boilers and soap-works. The general trade is rather restricted by the position of the town above the rapid streams of the Dniester; but there is a very thick trade in wood. Three yearly markets are held, at the largest of which the movement amounts to upwards of 2,500,000 roubles. Population in 1861, 18,881, of whom 3472 were Jews; in 1871, 24,267.

On the site of the town of Ekaterrinoslaff there formerly stood the Polish castle of Koundak, built in 1635 by the French general Baudel. The Cossacks, having destroyed the castle, founded the villages of Old and New Koundak and Polvitsa. In 1765, the town was established by Potemkin, and in the following year the empress, Cathalina II., with her own hand laid the foundation stone of the Cathedral of the Transfiguration. The scheme of Potemkin for the extension of the city were neglected after his death, and Paul I. changed the very name into Novo Rosslesk. The original name was restored in 1809, and the city raised to its present rank in 1830. The cathedral was built on the site originally proposed, but according to a less extensive scale.

EKHMIN, or ARKHMIN, a town of Upper Egypt, a short distance from the right bank of the Nile, between two and three miles above Suheig. It is a place of about 3000 or 4000 inhabitants, has several mosques and two Coptic churches, maintains a weekly market, and manufactures shaws and checked cotton. Outside of the walls are the ruins of two ancient temples, one of which, identified by an inscription of the 12th year of the emperor Trajan as that of Pan, was regarded by Abulfeda as among the most important in Egypt.

Ekhmin, in Coptic Ekhnin or Shmin, is the ancient Chemmis or Panopolis, chief town of the Chemmis nome in the Thebais, and, according to Strabo, inhabited by skullful stone-cutters and huntmen. Ekhnin is one of the oldest cities in the country. Herodotus particularly mentions a temple of Perseus, and asserts that the inhabitants celebrated gymnastic games in honor of this hero; but it has not been ascertained to which of the Egyptians this account should be assigned. Panopolis, or Ekhmin, his probably decayed with the rise of Thebes, and long after it suffered greatly at the hands of the Arab invaders. At the time of Aume-Poocke's visit in 1738, it was still the seat of a powerful em­peror, who extended his protection to the Coptic Catholics, but the dynasty of which he was the last representative, having been transferred before its restoration to the Jesuites, its maintenance of a sanctuary to Beelzebub is mentioned in 2 Kings i. At the time of the Crusades it was still a large village; but now, according to Porter, it contains only 50 mud houses, and has no visible remains of antiquity except two finely built walls.

ELAGABALUS. See HELIOGABALUS.

ELAM. This is the name given in Scripture to the province of Peressa called Susiana by the classical geographers, from Sus or Shushan its capital. In one passage, however (Ezra iv. 9), it is confined to Elamis, the north-western part of the province, and its inhabitants distinguished from those of Shushan, which elsewhere (Dan. viii. 2) is placed in Elam. Strabo (vi. 3, 12, &c.) makes Susiana a part of Persia proper, but a comparison of his account with those of Ptolemy (vi. 3, 1, &c.) and other writers would limit it to the mountainous district to the east of Babylonia, lying between the Oritoas and Tigris, and stretching from India to the Persian Gulf. Along with this mountainous district went a fertile low tract of country on the western side, which also included the marshes at the mouths of the Euphrates and Tigris and the north-eastern coast land of the Gulf. This low tract, though producing large quantities of grain, was intensely hot in summer; the high regions, however, were cool and well watered. The whole country was occupied by a variety of tribes, all speaking agglutinative dialects allied to each other and to the so-called Accadian language of primitive Chaldeans, but in very different stages of civilization. The most important of the tribes were the natives of southern Susiana, called Anzan in the cuneiform inscriptions, who established their capital at Sus, and founded a powerful monarchy there at a very early date. Strabo (xi. 13, 3, 6), quoting from Nearchus, seems to include them under the Elamians, whom be associates with the Uxii, and places on the frontiers of Persia and Susa; but Pliny more correctly makes the Euxine the boundary between Susiana and Elam (N. H., vi. 31), as the Uxii are described as a robber tribe in the mountains adjacent to Media, and their name is apparently to be identified with the title given to the whole of Susiana in the Persian cuneiform inscriptions, Uxii, or “Aborigines.” Uwas the probably the origin of the modern Khuzistan, though Mordtmann would derive the latter from خیث “a sugar-reed.” Immediately bordering on the Persians were the Amardians or Mardians, in whom we may see the Aparashuntiches and Aparasities of Ezra iv. 9, as well as Khappiri or Khalpiri, the name given to Susiana in the Protomadic cuneiform texts, which are written in the agglutinative dialect of the Turanian Medes and northern Elamites. Khappiri appears as Apir in the inscriptions of Mal-Amir. Passing over the Mesababa, which inhabited a valley which may perhaps be the modern Mah-Sabadan, as well as the level district of Yamutbal and Yabtur (with its capital Duran or Deri) which separated Elam from Babylonia, and the smaller districts of the Arman, Cambodene, Chorian, and Getu, and their traditions and sepulchres behind. Nonnes, the Greek poet, was born at Chemmis in 410, and Nersonas died and were buried there about 447.

EKRON, in the Septuagint and Apocrypha Acrecor (Jerusalem), a royal city of the Philistines, identified with the modern Syrian village of Akir, five miles from Ramleh, on the southern slopes of a low ridge separating the plain of Philistia from Sharon. Though included by the Israelites within the limits of the tribe of Judah, and mentioned in Judges xix. as one of the cities of Dan, it was in Philistine possession in the days of Samuel, and apparently maintained its independence. According to the narrative of the Hebrew text, here differing from the Septuagint and Josephus, it was the last town to which the ark was transferred before its restoration to the Israelites. Its maintenance of a sanctuary to Beelzebub is mentioned in 2 Kings i.
important were they, that the whole of Susiana was sometimes called Cisnia after them as by Herodotus (iii. 91; v. 49, etc.). In fact, Susiana was only a late name for the country, dating from the time when Susa had been made a capital of the Persian empire. The Accadian name was Numa, "the highlands" (compare the Vogul name "high"), or Subarti, with the same meaning, and of this the Semitic Elamus (from ἐλαμ) was only a transliteration. Such was also the signification of the native Khapir or Aspir, also writing Khurb, which is synonymous with Subarti (comp. Eber, Gen. xi. 14). The Assyrian inscriptions have disposed of the suggestion, first made by J. Muller and Lassen, that Elam was a corrupt form of the Indo-European Airyama.

The principal mountains of Elam were on the north, called Charbanus and Cambalhus by Pline (vi. 27, 31), and belonging to the Parachotas chain. In the inscriptions they have the general name of "mountains of the east," which extended into Media, where "the mountain of Nize," or "the mountain of the world," the present mountain of ard, was believed to be the spot on which the ark had rested, and the cradle of mankind. There were numerous rivers flowing into either the Tagrus or the Persian Gulf. The most important were the Ulai or Elaeus (Kūran) with its tributary the Panitgiris, the Choaspe (Kerkhah), the Cappadus (River of Dua called Hute in the inscriptions), the Hedypus or Hedypnus (Jervul), and the Orotas (Hwylgan), besides the monumental Surappa and Uvki, or "white river," perhaps to be identified with the Hedyphon and Orotas, which fell into the sea in the neighbourhood of the Caldat of Bit-Yagina, of Khindar, and of the Gambulat, in the marshy region at the mouth of the river. Shushan or Susana (see "Shapur") of the capital, now marked by the mounds of Shush, stood near the junction of the Choaspes and Elaeus (see Susa); and Badada, Madaktu in the inscriptions, lay between the Shapur and the river of Dua. Among the other chief cities mentioned in the inscriptions, may be named Naditu, Khalitemas, Dim-sar, Babulu, Bit-imbi, Khalidu, and Nagutu on the sea coast. Here, in fact, lay some of the oldest and wealthiest towns, the sites of which have, however, been removed inland by the silting up of the shore. The monumental Dilvan, for instance, which according to Sargon was an island 90 ells from the land, is now probably represented by Buuder Dilvan.

The civilization of southern Elam was of very great antiquity. The Accadian or "Highlanders," who inhabited the south, possessed the cities and countries descending from its mountains, carrying with them the picture-writing which afterwards developed into the cuneiform syllabary. An examination of the animals with which they were acquainted was the sea, the ox, the sheep, the gazelle, the bear, the wild bull, the dove, the snake, the fly, the flea, the moth, the bee, and different species of fish, horses, called the "animals of the east," being a subsequent importation. Neither the palm nor the vine were known before their immigration into Babylon, indeed, Strabo states that the vine was first introduced into Susana under the Macedonians. The different tribes of the country were constantly invading Babylon, and from time to time imposed their domain upon it. About 2800 B.C. (according to the date furnished by Assur-bani-pal), the Elamite king Cudur-nankhundi carried away the mannasehs, etc., of the land, which lasted for two generations, his son Run-Agin or En-Aca (Arach) of Larsa being afterwards conquered by Khannun. Cudur was the son of dllamashu, who is identified with the "first Hurrian from Ushumana, who first established Babylon at a very early period of its history, and one of its kings, Aga-kak-nim, had restored the great temple of Bel at Babylon. The whole race represented for the overthrow of the second Cassite dynasty, Elamites from time to time appear as kings of Babylon, and about 1200 B.C. the whole country was ravaged and desolated by the Elamite chieftains. Revenge for this, however, was shortly afterwards taken by the Babylonian Nebuchadnezzar Subsequently, we find Elam and Babylon in alliance against the Medes, and the Assyrians, and in the 5th and 6th centuries B.C., when Babylon was alternately under the sway of the Assyrian princes and of Chaldea and other adversaries, Elam played a large part in its political history. Tuglath-Phileser II., in 740 B.C., first overran the sea-coast as far as the Ulai and Khumba, and in 721 Sargon met Khumbu at the battle of Dura, and drove him across the Assyrian frontier. After the overthrow of Babylon by the Assyrian empire in the west and north, the reduction of Babylonians to a dependent province became a necessity, and this involved the weakening and final conquest of the powerful kingdom of Elam, when itself. The struggle lasted through the reigns of four Assyrian kings, Sargon, Sennacherib, Esarhaddon, and Assur-bani-pal, and the overthrow of Elam was eventually effected by the help of a Medes, and eastward the Medes and Elamites were reduced to vassals. The language of the Hebrew prophets seems to have been allied. In fact, the late period Babyloman to a dependent province became a necessity, and this involved the weakening and final conquest of the powerful kingdom of Elam, when itself. The struggle lasted through the reigns of four Assyrian kings, Sargon, Sennacherib, Esarhaddon, and Assur-bani-pal, and the overthrow of Elam was eventually effected by the help of a Medes, and eastward the Medes and Elamites were reduced to vassals. The language of the Hebrew prophets seems to have been allied.
ELAND (Boedaphus orca) is the largest and most valuable member of the antelope family. It is fully equal to the horse in size, standing six feet high at the shoulders, and measuring nine feet from the nose to the root of the tail. In robustness of build it resembles the ox, and forms the type of the bovine subdivision of antelopes. Its neck is thick, and is furnished with a prominent dewlap, fringed with long hair. Except on the ridge of the back the fur is short, and is usually of a reddish fawn colour above, and white beneath. Its horns are about 20 inches in length, nearly straight, and in the male are surrounded throughout the greater part of their length with a spiral writh; in the female they are more slender, and the spiral ridge is indistinct or absent. The eland is a native of South Africa, where it roams in considerable herds over the open plains, and is usually found in the isolated groves of Acacia capensis, which, like islands in the ocean, are scattered over many of the stony and gravelly plains of the interior. It is slow in its movements as compared with the other antelopes, and is readily captured, while in disposition it is exceedingly gentle, and thus seems eminently adapted for domestication. It breeds readily in confinement, and herds of elands have already been introduced into various parks in Britain. Its flesh is highly prized as an article of food, resembling beef, it is said, in grain and colour, but being more delicate and better flavoured. The eland is remarkable for the quantity of animal food which, it is said, in grain and colour, but being more delicate and better flavoured. The eland was formerly abundant in the stony and gravelly plains of the interior.

... ELASTICITY...
4. The elasticity of shape of many solids is not perfect: it is not known whether it is perfect for any. It might be expected to be perfect for glass and rock crystal and diamond and other hard, brittle, homogeneous substances; but experiment proves that at all events for glass it is not so, and shows on the contrary a notable degree of imperfection in the torsional elasticity of glass fibres. It might be expected that in copper and soft iron and other plastic metals the elasticity of shape would be very imperfect; experiment shows, on the contrary, that in copper, brass, soft iron, steel, platinum, provided the distortion does not exceed a certain limit in each case, elasticity of shape is remarkably perfect, much more perfect than in glass. It is quite probable that even in the softer metals—zinc, tin, lead, cadmium, potassium, sodium, &c.—the elasticity of shape may be as perfect as in the metals mentioned above, but within narrower limits as to degree of distortion. Accurate experiment is utterly wanting; to discover what is the degree of imperfection, if any, of the elasticity of any metal or alloy, when tested within sufficiently narrow limits of distortion.

5. The "viscosity of metals" described below (sections 21–25) does not demonstrate any imperfectness of elasticity according to the definition of section 1, which is purely statistical. The viscosity of solids may (for all we yet know by means of experiment) depend upon a viscosity of fluids, upon a resistance varying with the velocity of the change, and vanishing when the velocity of the change is zero; that is to say, when the body is at rest in any configuration; if so, the elasticity of the substance concerned is perfect within the limits of the experiment in question. If, on the other hand (as the discovery of elastic fatigue described below seems to indicate may be to some degree the case), the loss of energy from the vibrations in the experiments described is due to a dependence of the elastic resilient force upon previous conditions of the substance in respect to strain, the "viscosity" would be continuous with a true imperfectness of strain elasticity. Here, then, we have a definite question which can be answered by experiment only:—Consider a certain definite stress applied to a solid substance, as, for example, a certain "couple" twisting a wire or rod; or a certain weight pulling it out, or compressing it lengthwise; or a certain weight placed on the middle of a beam supported by trebles under its ends. Let it be applied and removed a great many times, and suppose it to be seen that after each application and removal of the stress the body comes to rest in exactly the same configuration as after the previous application or removal of the stress. If now the body be left to itself with the stress removed, and if it be found to remain at rest in the same configuration for minutes, or hours, or days, or years after the removal of the stress, a part of the definition of perfect elasticity is fulfilled. Or, again, if the stress be applied, and kept applied with absolute constancy, and if the body remain permanently in a constant configuration, another item of the definition of perfect elasticity is proved. When any such experiment is made on any metal, unless some of the softer metals (section 4) is to be excepted, there is certainly very little if any change of configuration in the circumstances now supposed. The writer believes, indeed, that nothing of the kind has hitherto been discovered by experiment, provided the stress has been considerably less than that which would break or give a notable permanent twist, or elongation, or bend, to the body, that is to say, provided the distortion has been kept below any of the limits of the body's elasticity as commonly understood (sections 7–20). Mr J. T. Bottomley, with the assistance of a grant of money from the British Association, has commenced making arrangements for secular experiments on the elasticity of metals, in the tower of the university of Glasgow, to answer this question in respect to permanence or non-permanence through minutes, or hours, or days, or years, or centuries. If several gold wires are hung side by side, one of them bearing the smallest weight that will keep it approximately straight, another wire $\frac{1}{2}$ of the breaking weight, another wire $\frac{1}{5}$ of the breaking weight, and so on; the one of them bearing $\frac{1}{2}$ of the breaking weight will probably, in the course of a few hours or days, show very sensible elongation. Will it go on becoming longer and longer till it breaks, or will the time-curve of its elongation be asymptotic? Even with considerably less than $\frac{1}{2}$ of the breaking weight there will probably be a continually augmenting elongation, but with asymptotic time-curve indicating a limit beyond which the elongation never goes, but which it infinitely nearly reaches in an infinite time. It is not probable that a gold wire stretched by $\frac{1}{5}$ of its present breaking weight, or by $\frac{1}{4}$ of its present breaking weight, or even by $\frac{1}{3}$ of its present breaking weight, would break in a thousand or in a million years. The existence of gold ornaments which have been found in ancient tombs and cities, and have preserved their shapes for thousands of years without running down glacier-wise (as does brittle pitch or sealing-wax in the course of a few years in moderately warm climates), seems to prove that for gold (and therefore leaves no doubt also for many other metals) the time-curve is asymptotic, if indeed there is any slow change of shape at all after the application of a moderate stress well within the limits of elasticity. Egyptian and Greek statues, Etruscan vases, Egyptian obelisks, and other stone monuments with their engraved hieroglyphics, flint implements and moulders, and mountains with the geological evidence we have of their antiquity, prove for stones, and pottery, and rocks of various kinds, a permanence for thousands and millions of years of resistance to distorting stress.

6. The complete fulfilment of the definition of perfect elasticity is not proved by mere permanence of the extreme configurations assumed by the substance when a stated amount of the stress is alternately applied and removed. This condition might be fulfilled, and yet the amount of elastic force might be different with the same palpable configuration of the body during gradual augmentation and during gradual diminution of the stress. That it is so in fact is proved by the discovery of viscosity referred to below; but it is not yet proved that if, after increasing the stress to a certain definite amount, the body is brought to rest in the same palpable configuration as before it, the amounts of stress required to hold it in this configuration are different in the two cases. If they are (section 1) the elasticity is imperfect; if they are not the elasticity is perfect within the limits of the experiment (compare section 36 below).

7. LIMITS OF ELASTICITY—Elasticity of Shape.—The degree of distortion within which elasticity of shape is found is essentially limited in every solid. Within sufficiently narrow limits of distortion every solid shows elasticity of shape to some degree—some solids to perfection, so far as we know at present. When the distortion is too great, the body either breaks or receives a permanent bend (that is, such a molecular disturbance that it does not return to its original figure when the bending force is removed). If the first notable deviation from perfectness of elasticity is a breakage, the body is called brittle. A permanent bend, plastic or malleable or ductile. The metals are generally ductile; some metals and metallic alloys and compounds of metals with small proportions of other substances, are brittle; some of them brittle only in certain states of temper, others it seems essentially brittle. The steel of before the days of Bessemer and Siemens is a remarkable instance. When slowly cooled from a bright
ELASTICITY

red heat, it is remarkably tough and ductile. When heated
to redness and cooled suddenly by being plunged in oil or
water or mercury, it becomes exceedingly brittle and hard
(glass-hard, as it is called), and to ordinary observation
seems incapable of taking a permanent bend (though prob-
ably careful observation would prove it not quite so). The
definition of steel used to be approximately pure iron capa-
cible of being tempered glass-hard, the possibility of
brittleness supervening in the course of any treatment
which the metal may meet with, in its manufacture being
an objection against the use of what was formerly called
steel for ship's plates, ribs, strainers, etc., and for many
applications of land engineering, even if the material could
be had in sufficient abundance.

8. Limits of Elasticity (continued)—Elasticity of
Bulk. If we reckon by the amount of pressure, there is
probably no limit to the elasticity of bulk in the direction
of increase of pressure for any solid or fluid; but whether
continued augmentation produces continued diminution of
bulk towards zero without limit, or whether for any or
every solid or fluid there is a limit towards which it must
be reduced in bulk, but smaller than which no degree of
pressure, however great, can condense it, is a question
which cannot be answered in the present state of science.
Would any pressure, however tremendous, give to gold a
density greater than 19-9, or to copper a density greater
than 9-6, after the pressure is removed (section 3 above)?
But whether the body be fluid or a continuous non-
porous solid, it probably recovers the same density, how-
ever tremendously it may have been pressed, and probably
shows perfect elasticity of bulk (section 3 above) through
the whole range of positive pressure from zero to infinity.
Provided the pressure has been equal in all directions like
fluid pressure. As for negative pressure, we have no knowl-
edge of what limit, if any, there may be to the amount of
force which can be applied to a body pulling its surface
equal in all directions. The question of how to apply
the negative pressure is incomparably involved with that of
the body's power to resist. The upper part of the mercury
of a barometer adhering to the glass above the level cor-
responding to the atmospheric pressure is a familiar example
of what is called negative pressure in liquids. Water and
other transparent liquids show similar phenomena, another
of which is the warning of water above its boiling point
in an open glass or metal vessel varnished with shellac.
Attempts to produce great degrees of this so-called negative
pressure are baffled by what seems an instability of the
equilibrium which supervenes when the negative pressure
is too much augmented. It is a very interesting subject for
experimental inquiry to find how high mercury or water or
any other liquid can be got to stand above the level cor-
responding to the atmospheric pressure in a tall hermetically
sealed tube, and how many degrees a liquid can, with all
precautions, be warmed above its boiling point. In each case
it seems to be by a minute bubble forming and expanding
somewhere at the boundary of the liquid, where it is in
contact with the containing vessel, that the possible range
of the negative pressure is limited, judging from what we
see when we carefully examine a transparent liquid, or the
surface of separation between mercury and glass, in any
such experiment. The contrast of the amounts of the
negative pressure practically obtainable or obtained
lithester in such experiments on liquids (which are at the
most those corresponding to the weight of a few metres of
the substance), with that obtainable in the case of even the
weakest solids, is remarkable; and as for the strongest,
consider for instance (sec. 23 below) 17 nautical miles of
steel pianoforte wire hanging by one end. When a cord,
or rod, or wire of any substance hangs vertically,
the negative pressure (for example, 23,000 atmospheres in
the case just cited) in any transverse section is equal to
the weight of the part hanging below it. It is an interest-
ing question not to be answered by any experiment easily
made or even devised,—how much would the longitudinal pull
which can be applied to a cord, rod, or wire without break-
ing it be augmented (probably augmented, but possibly
diminished) by lateral pull applied all round the sides so as
to give equal negative pressure in all directions?

9. Limits of Elasticity (continued)—Elasticity of
Shape for Distortions not Uniform Through the Sub-
stance, and for Compound Distortions; and Elasticity cor-
responding to Co-existent Distortions and Change of Bulk:

Example 1.—A round wire twisted, or a cylindrical shaft trans-
mitting revolution motive in machinery, presents, as we shall see
(sec. 64), an instance of sample distortion, but to different degrees
in different parts of the substance, increasing from the axis where
it is zero, uniformly to the surface where it is greatest.

Example 2.—Elongation of a wire or rod by direct pull, is
(sec. 23) an instance of a compound distortion co-existing with
a radiation of the substance, both distortion and radiation uniform
throughout.

Example 3.—Shortening of a column by end pressure is an in-
stance of a similar compound distortion, but to different degrees
in different parts of the substance, increasing from the axis
where it is zero, uniformly to the surface where it is greatest.

Example 4.—Flexure of a round wire or of a bar, or beam,
or girder, of any shape of normal section, by opposite bending couple
applied at the two ends, is an instance in which one-half of the
substance is stretched, and the other half shortened with exactly the
same combination of distortions and changes of bulk as in examples
2 and 3. The strain is uniform along the length of the bar, but
varies in the cross section in simple ratio to the variation of the
same line (sec. 63) through the centre of gravity of the sectional
area, which, in the case of a round bar, is the diameter perpendicular
to the plane of curvature.

The limits of elasticity in the cases of these four examples
are subjects of vital importance in practical mechanics,
and a vast amount of careful and accurate observation and
experiment, which has given much valuable practical
information regarding them, has been gone through by
engineers, in their necessary dealings with questions regard-
ing strength of materials. Still there is great want of
definite scientific information on the subject of limits of
elasticity generally, and particularly on many elementary
questions (section 21 below), which force themselves
upon us when we endeavour to analyse the molecular
actions concerned in such cases as the four examples
before us. Some principles of much importance for guidance
in practical as well as theoretical deductions from observa-
tions and experiments on this subject were set forth twenty-
ine years ago by Professor James Thomson, in an article
published in the Cambridge and Dublin Mathematical
Journal for November 1848. Nothing is to be gained
either in clearness or brevity by any other way of dealing
with it than reproducing it in extenso. It is accordingly
given here, with a few changes made in it with its author's
concurrence.

It constitutes the following sections, 10—20.

"On the strength of materials, as influenced by the existence or
non-existence of certain mutual strains" among the particles com-
mposing them. By James Thomson, M.A., College, Glasgow.

10. "My principal object in the following paper is to show that the
absolute strength of any material composed of a substance posses-
sing ductility (and few substances, if any, are entirely devoid
of the property) may vary to a great extent, according to the
state of tension or relaxation, in which the particles have been made
to exist when the material as a whole is subject to no external strain.

11. "Let, for instance, a round bar of malleable iron, or a piece
of iron rod, be made red hot, and then be allowed to cool. Its

[Note added Nov. 1877.] More nearly what is now called stress than what is
now called strain is meant by "mutual strain" in this article, which was written in
1848 in connexion with the introduction of the word strain and the distinct definition of the word
strain (see chap. 1 of Mathematical Theory below).
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particles may now be regarded as being completely relaxed. Let, next, one end of the bar be fixed, and the other be made to receive particles at the circumference of the bar are strained to the utmost extent of which they can admit, without undergoing a permanent alteration in their mutual connection. By the arrangement of the elements of the cross section of the bar afford resistances proportional to the distances of the elements from the centre of the bar; since the particles are displaced in the same direction, the circumstances will be such as to make the distances proportional to the distances of the particles from the centre. The couple which the bar now resists, and which is equal to the sum of the couples due to the resistances of all the elements of the section, is that which is commonly assumed as the measure of the torsional strength of the bar. For future reference, this couple may be denoted by $\tau$, and the angle through which it has twisted the loose end of the bar by $\theta$.

12. The twisting of the bar may, however, be carried still farther, and during the progress of this process the outer particles will yield in virtue of their ductility, those towards the interior subsequently reaching their elastic limits, until, when the twisting has been sufficiently continued, all the particles in the section, except those quite close to the centre, have been strained beyond their elastic limits. Hence, if we suppose $^1$ that no change in the hardness of the substance composing the material has resulted from the sliding of its particles past one another, and that therefore all small elements of the section of the bar afford the same resistance, no matter what their distances from the centre may be, it is easy to prove that the total torsional resistance of the bar is of what it was in its former state; or, according to the notation already adopted, it is $^\pi \tau L$.

13. If, after this, all external stress be removed from the bar, it will assume a new position of equilibrium in which the outer radius will be strained in the direction opposite to that in which it was twisted, and the inner ones in the same direction as that of the twisting, the two sets of opposite couples thus produced among the particles of the bar balancing one another. It is easy to show that the line of separation between the particles strained in one direction and those in the other is a circle whose radius is $\theta$ of the radius of the bar. The particles in this line are evidently subject to no strain $^4$ when no external couple is applied. The bar

...with its new molecular arrangement may now be subjected, as often as we please, to the couple $\pi L$ without undergoing any further alteration. Its strength to resist torsion, in the direction of the length of the couple $L$ has therefore been determined. Its strength to resist torsion in the opposite direction has, however, by the same process, been much diminished, for as soon as its free extremity has been made to rotate through an angle of $\theta$ from the position of equilibrium, the particles of the bar are strained beyond their elastic limits, and they will suffer the utmost distortion of which they can admit without undergoing permanent alteration. Now, it is easy to prove that the couple required to produce a certain angle of torsion is the same in both cases, the new state of the bar as in the old. Hence the ultimate strength of the bar when twisted backwards is represented by a couple amounting to $\pi L$. But, as we have seen, it is $\theta L$ when the wire is twisted forwards. This then, is, is that the force in its new state has twice as much strength to resist torsion in one direction as it has to resist it in another.

14. Principles quite similar to the foregoing, are applicable in regard to beams subjected to cross strain. As, however, our chief object at present is to point out the existence of such principles, to elucidate the mode in which they are to be applied, and to show the great practical importance in the determination of the strength of materials, I need not enter fully into their application in the case of cross strain. The investigation in this case closely resembles that in the case of torsion, but is more complicated on account of the different ultimate resistances afforded by any material to compression and to extension, and on account of the nature of the variations in the form of sections of beams which for different purposes it is found advisable to adopt. I shall therefore merely make a few remarks on this subject.

15. If a bent bar of wrought iron or other ductile material be straightened, its particles are strained in a manner in which the outer radius will be strained in the direction opposite to that in which it was twisted, and the inner ones in the same direction as that of the twisting, the two sets of opposite couples thus produced among the particles of the bar balancing one another. It is easy to show that the line of separation between the particles strained in one direction and those in the other is a circle whose radius is $\theta$ of the radius of the bar. The particles in this line are evidently subject to no strain when no external couple is applied. The bar

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Elasticity

cause of an important fact observed by Mr Eaton Hodgkinson in his valuable researches in regard to the stress of cast iron (Report of the British Association for 1857, p. 361.) He has shown that, contrary to what had been previously supposed, a strain, however small in comparison to that which would occasion rupture, which is called a set, or permanent change of the beam, or strain, and the beams on which he experimented. Now this is just what should be expected in accordance with the principles which I have brought forward for the explanation of the causes already pointed out, viz., the parts of a beam previously to the application of an external force have been strained to the utmost, when, by the application of any force, however small, they are still further displaced from their positions of rest, and must necessarily undergo a permanent alteration in their connexion with one another, an alteration permitted by the ductility of the material; or, in other words, the beam as a whole must take a set.

18. In accordance with this explanation of the fact observed by Mr Hodgkinson, I do not think we are to conclude with him that 'the utmost of loading bodies within the elastic limit has no foundation in fact.' It appears to me that the defect of elasticity, which he has shown to occur even with very slight strains, exists only when the strain is applied for the first time; or, in other words, that if a beam has already been subjected to a considerable strain, it may again be subjected to any smaller strain in the same direction without its taking a set. It will readily be seen, however, from Mr Hodgkinson's experiments, that the beam 'elastic limit,' as commonly employed, is entirely vague, and must tend to lead to erroneous results.

19. The considerations adduced seem to me to show clearly that there really exist two elastic limits for any material, between which the displacements or deflexions, or what may in general be termed changes of form, must be confined, if we wish to avoid giving the material a set, or, in case of variable strains, if we wish to avoid giving it a continuous succession of sets which would gradually bring about its destruction; and that these two elastic limits are usually attained one on the one side and the other on the opposite side of the position which the material assumes when subjected to an external strain, though they may be both on the same side of this position of relaxation, and that they may therefore with propriety be called the superior and the inferior limits of the material for the particular arrangement which has been given to its particles; that these two limits are fixed for any given material, but that, if the change of form be continued beyond the limits of the two new limits, by means of an alteration in the arrangement of the particles of the material, be given to it in place of those which it previously possessed; and lastly, that the process employed in the manufacture of materials are usually such as to place the two limits in close contiguity with one another.

20. The introduction of new, though necessary, elements into the consideration of the strength of materials may, on the one hand, seem annoying from rendering the investigations more complicated. On the other hand, their introduction will really have the effect of obviating difficulties, by removing erroneous modes of viewing the subject, and preventing contradictory or incongruous results from being obtained. Thus, the alteration of the section in the beam, which, as before stated, is an actual position assumed by each of the two limits are determined by the peculiar strains which are subsequently applied to the material.

21. Passing now to homogeneous material (sec. 38), homogeneously strained (chap. ii, of Math. Theory below), we are met by physical questions of great interest regarding limits of elasticity. Supposing the solid to be homogeneously distorted in any particular way to nearly the limit of its elasticity for this kind of distortion, with the limits be widened or narrowed by the superposition of negative or positive pressure equal in all directions producing a dilatation or a condensation 1. It seems probable that a dilatation would narrow the limits of elasticity, and a condensation widen them. This, however, is a mere guess: experiment alone can answer the question. Taking a somewhat less simple case. A wire is stretched by a weight to nearly its limits of longitudinal elasticity; a couple twisting it is applied to its lower end—will this either cause the weight to run down and give the wire a permanent set, or break it? Probably—yes; but experiment only can decide. The corresponding question with reference to a column loaded with a weight may have the same answer, but not necessarily so. Experiment again in wanting. A wire hanging stretched by a light weight, merely to steady it, is twisted to nearly its limit of torsional elasticity by a couple of given magnitude applied to its lower end: the stretching weight is increased.—Will this cause it to yield to the couple and take a permanent set 1 Probably—yes. (Certainly yes, for steel piano-forte wire experimented on by Mr M'Farlane to answer this question since it was put in type for this edition 2.) If so, the limits of torsional elasticity of a wire bearing a heavy weight are widened by diminishing or taking off the weight; and no doubt it will follow continuously that a column twisted by opposing couples at its two ends will have its limits of torsional elasticity widened by the application of forces to its two ends, pressing them towards one another. Experiments to answer these questions would certainly reward the experimenter with definite and interesting results.

22. Narrowness of Limits of Elasticity—Solids.—The limit of elasticity of metals, stones, crystals, woods, are so narrow that the distance between any two neighbouring points of the substance never alters by more than a small proportion of its own amount without the substance either breaking or experiencing a permanent set, and therefore the angle between two lines meeting in any point of the substance and passing always through the same matter is never altered by more than a very slight difference, as illustrated in the diagram (Fig. 1.)

! For further information regarding Mr Hodgkinson's views and experiments see his 'Remarks on the Sections of the British Association for the years 1852-3' (29 April 1854, p. 86), and a week by him entitled 'Experimental Researches on the Strength and other Physical Qualities of Cast Iron,' on the Royal Institute of Science at the British Association for 1851.

2 Thus if the section of a beam be of such form that strain in either of the sectioning figures, the one rib or the other, as the case may be, being very weak in comparison to the other part of the beam, it may readily occur that the two sections will be strained exactly on the same side of the position assumed by the base when the external force is free of the beam, though it may have been subject to the action of strain and then loaded or unloaded, or employed as to make all its parts exert their utmost forces, and if the beam be not compressed, the particle as it may come to be compressed to the utmost before the load has been entirely removed.
where the continuous lines represent a portion of the unpulled wire, and the dotted lines the same portion of the wire when pulled. The change in each of the angles would be $\frac{1}{\sqrt{\text{rad}}}$ of the radian in virtue of the elongation were there no lateral shrinking, and about $\frac{1}{\sqrt{\text{rad}}}$ of the radian in virtue of the lateral shrinking were there no elongation. The whole change experienced by each of the right angles is therefore actually (section 37) $\frac{1}{\sqrt{\text{rad}}} + \frac{1}{\sqrt{\text{rad}}}$ or about $\frac{1}{\sqrt{\text{rad}}}$ of the radian, or $0.84$. This is an extreme case. In all other cases of metals, stones, glasses, crystals, the substance either breaks or takes a permanent bend, probably before it experiences any very great angular distortion as a degree; and except in the case of steel we may roughly regard the limits of elasticity as being something between $\frac{1}{\sqrt{\text{rad}}}$ and $\frac{1}{\sqrt{\text{rad}}}$ in respect to the linear elongation or contraction, and from $\frac{1}{\sqrt{\text{rad}}}$ of a degree to half a degree in respect to angular distortion.

24. On the other hand, gelatinous substances, such as india-rubber and elastic jellies, have very wide limits of elasticity. A vulcanized india-rubber band, for instance, is capable of being stretched, again and again, to eight times its length, and returning always to nearly its previous condition when the stress is removed. A shape of transparent jelly presents a beautiful instance of great degrees of distortion with seemingly very perfect elasticity. All these instances, india-rubber and jellies, show with great changes of shape but slight changes of bulk. They have, in fact, all, as nearly as experiment has hitherto been able to determine, the same compressibility as water.

25. Cork, another body with very wide limits of elasticity (very imperfect elasticity it is true) is singular, among bodies seeming homogenous to the eye, in its remarkably easy compressibility. It is, in fact, the only seemingly homogenous solid which shows to the unaided eye any sensible change of bulk under any practically applicable forces. A small homogenous piece torn out of a cork may, by merely pressing it between the fingers, be readily compressed to half its bulk, and a large slab of cork in a Branah press may be compressed to $\frac{1}{\sqrt{\text{rad}}}$ of its bulk. An ordinary bottle cork loaded with a small piece of metal presents a very interesting appearance in an Oersted glass compressing vessel; first floating, and when compressed to 20 or 30 atmospheres sinking, and shrivelling in bulk very curiously; then on the pressure being removed, expanding again, but not quite to previous bulk, and floating up or remaining down according to the amount of its load.

The diverseness presented by cork and gelatinous bodies in opposite directions from the regular elasticity of hard solids form an interesting subject, to which we shall return later (section 48).

26. Liquids.—In respect to liquids, there are no limits of elasticity so far as regards the magnitude of the positive pressure applied or conceivably applicable; but in respect to the magnitude of negative pressure, and in respect to the magnitude of the change of bulk, whether by negative or positive pressure, there are probably very decided and not very wide limits. Thus water, though condensed to $\frac{1}{\sqrt{\text{rad}}}$ of its bulk by 2000 atmospheres in Perkins’ experiments corrected roughly for the compressibility of his glass “piezometer,” which is very nearly at the rate of $1.77$ per atmosphere found (section 75) more accurately by subsequent experiments for moderate pressures up to 20 or 30 atmospheres, may be expected to be compressed by much less than $\frac{1}{\sqrt{\text{rad}}}$ of its volume under a pressure of 7000 atmospheres. How much it or any other liquid is condensed by a pressure of 10,000 atmospheres, or by 20,000 atmospheres, is an interesting subject for experimental investigation.

27. Gases.—In respect to rarefaction, and in respect to proportionate condensation, gases present enormously wider limits of elasticity than any liquids or solids,—in fact no limit in respect to dilatation, and in respect to condensation a definite limit only when the gas is below Andrew’s “critical temperature.” If the gas be kept at any temperature above that critical temperature, it remains homogeneous, however much it be condensed, and therefore for a fluid above the critical temperature there is, in respect to magnitude of pressure, no superior limit to its elasticity. On the other hand, if a fluid be kept at any constant temperature less than its critical temperature, it remains homogeneous, and presents an increasing pressure until a certain density is reached; when its bulk is further diminished it divides into two parts of less and greater density (the part of less density being called vapour, that of greater density being called liquid, if it is not solid) and presents no further increase of pressure until the vaporous part shrinks to nothing, and the whole becomes liquid (that is to say, homogenous fluid at the greater of the two densities) or else becomes solid—the question whether the more dense part is liquid or solid depending on the particular temperature below the critical temperature at which the whole substance is kept during the supposed experiment.

28. The thermo-dynamic reasoning of Professor James Thomson, which showed the effect of change of pressure in altering the freezing point of a liquid, leads to analogous considerations regarding the effect of continuous increase or decrease of pressure upon a gas consisting of the same substance partly in the liquid and partly in the solid state at one temperature. The three cases of transition from gas to liquid, from gas to solid, and from liquid to solid, present us with perfectly definite limits of elasticity, the only perfectly definite limits of elasticity in nature of which we have any certain knowledge.

29. Viscosity of Fluids and Solids.—Closely connected with limits of elasticity, and with imperfectness of elasticity, is viscosity, that is to say, resistance to change of shape depending on the velocity of the change. The full discovery of the viscosity of liquids and gases is due originally to Stokes; and his hypothesis that in fluids the force of resistance is in simple proportion to the velocity of change of shape has been subsequently confirmed by the experimental investigations of Helmholtz, Maxwell, Meyer, Kundt, and Warburg. The definition of a fluid given in section 2 above may, by section 1, be transformed into the following:—A fluid is a body which requires no force to keep it in any particular shape, or—A fluid is a body which exercises no permanent resistance to a change of shape. The resistance to a change of shape presented by a fluid, evanescent as it is when the shape is not being changed (or vanishing when the velocity of the change vanishes), is essentially different from that permanent resistance to change of shape, the manifestation of which in solids constitutes elasticity of shape as defined in section 1.

Maxwell’s admirable kinetic theory of the viscosity of gases points to a full explanation of viscosity, whether of gases, liquids, or solids, in the consideration of configurations and arrangements of relative motions of molecules, permanent in a solid under distorting stress, temporary in fluids or solids while the shape is being changed, in

1 Transactions of Royal Society, June 1836, “On the Progressive Compression of Water by high degrees of force, with some trials of its effects on other liquids,” by J. Perkins. Communicated by W. H. Woolaston, M. D., V. P. B. S.
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virtue of which elastic forces in the quiescent solid, and viscous resistance to change of shape in the non-quiescent fluid or solid, are produced.

30. Viscosity of Metals and Fatigue of their Elasticity.—Experimental exercises performed by students in the physical laboratory of the university of Glasgow during the session 1864-65, brought to light some very remarkable and interesting results, proving a loss of energy in elastic vibrators (sometimes as much as two or three per cent. of energy lost in the course of a single vibration in our direction) incomparably greater than anything that could be due to imperfections in their elasticity (section 1), and showing also a very remarkable fatigue of elasticity, according to which a wire which had been kept vibrating for several hours or days through a certain range came to rest much quicker when left to itself than when set in vibration after it had been at rest for several days and then immediately left to itself. Thus it was found that the rates of subsidence of the vibrations of the several wires experimented on were generally much less rapid on the Monday mornings, when they had been at rest since the previous Friday, than on other days of the week, or than after several series of experiments had been made on a Monday. The following statement (sections 31-34) is extracted from a short article by W. Thomson, in the Proceedings of the Royal Society for May 18, 1865, containing some of the results of these observations.

31. „Viscosity. — By induction from a great variety of observed phenomena, we are compelled to conclude that no change of volume or of shape can be produced in any kind of matter without dissipation of energy. Even in dealing with the absolutely perfect elasticity of volume presented by every fluid, and possibly by some solids, as for instance, homogeneous crystals, dissipation of energy is an inevitable result of every change of volume, because of the accompanying change of temperature, and consequent dissipation of heat by conduction or radiation. The same cause gives rise necessarily to some degree of dissipation in connection with every change of shape of an elastic solid. But estimates founded on the thermodynamic theory of elastic solids, which I have given elsewhere,¹ have sufficed to prove that the loss of energy due to this cause is small in comparison with the whole loss of energy observed in many cases of vibration. I have also found, by vibrating a spring alternately in air of ordinary pressure and in the exhausted receiver of an air-pump, that there is an internal resistance to its motions immensely greater than the resistance of the air. The same conclusion is to be drawn from the observation made by Kupffer in his great work on the elasticity of metals, that his vibrating springs subsided much more rapidly in their vibrations than rigid pendulums supported on knife-edges. The subsidence of vibrations is probably more rapid in glass than in some of the most elastic metals, as copper, iron, silver, aluminium;² but it is much more rapid than in glass, marvellously rapid indeed, in some metals (as for instance zinc),³ and in india-rubber, and even in homogenious jellyes.

32. „The fractional resistance against change of shape must in every solid be infinitely small when the change of shape is made at an infinitely slow rate, since, if it were finite for an infinitely slow change of shape, there would be infinite rigidity, which we may be sure¹ does not exist in nature. Hence there is in elastic solids a molecular friction which may be properly called viscosity of solids, because, as being an internal resistance to change of shape depending on the rapidity of the change, it must be classed with fluid molecular friction, which by general consent is called viscosity of fluids. But, at the same time, it ought to be remarked that the word viscosity, as used hitherto by the best writers, when solids or heterogeneous semi-solid semi-fluid masses are referred to, has not been distinctly applied to molecular friction, especially not to the molecular friction of a highly elastic solid within its limits of high elasticity, but has rather been employed to designate a property of slow continual yielding through very great, or altogether unlimited, extent of change of shape, under the action of continued stress. It is in this sense that Forbes, for instance, has used the word in stating that † viscous theory of glacial motion,' which he demonstrated by his grand observations on glaciers. As, however, he and many other writers after him have used the words plasticity and plastic, both with reference to homogeneous solids (such as wax or pitch even though at brittle, soft metals, &c.) and to heterogeneous semi-solid semi-fluid masses (as mud, moist earth, mortar, glacial ice, &c.), to designate the property common to all cases of experiencing, under continued stress, either quite continued and unlimited change of shape, or gradually very great change at a diminishing (asymptotic) rate through infinite time, and as the use of the term plasticity implies no more than does viscosity any physical theory or explanation of the property, the word viscosity is without inconvenience left available for the definition I propose.

33. „To investigate the viscosity of metals, I have in the first place taken them in the form of round wires, and have chosen torsional vibrations, after the manner of Coulomb, for observation, as being much the easiest way to arrive at definite results. In every case one end of the wire was attached to a rigid vibrator with sufficient firmness (thorough and smooth soldering I find to be always the best plan when the wire is thick enough); and the other to a fixed rigid body, from which the wire hangs, bearing the vibrator at its lower end. I arranged sets of observations to be made for the separate comparison of the following cases:—

(a) The same wire with different vibrators of equal weights to give equal stretching-tractions but different moments of inertia (to test the relation between viscous resistances against motions with different velocities through the same range and under the same stress).

(b) „The same wire with different vibrators of equal moments of inertia but unequal weights (to test the effect of different longitudinal tractions on the viscous resistance to torsion under circumstances similar in all other respects).

(c) „The same wire and the same vibrator, but different initial ranges in successive experiments (to test an effect unexpectedly discovered, by which the subsidence of vibrations from any amplitude takes place at very different rates according to the immediately previous molecular condition, whether of quiescence or of recurring changes of shape through a wider range).

(d) „Two equal and similar wires, with equal and similar vibrators, one of them kept as continually as possible in a state of vibration, from day to day; the other kept at rest, except when vibrated in an experiment once a day (to test the effect of continued vibration on the viscosity of a metal).

34. „Results.—(a) It was found that the loss of energy in

¹ Those who believe in the existence of indivisible, infinitely strong and infinitely rigid, very small bodies (finite hard atoms!) deny this.


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a single vibration through one range was greater the greater the velocity (within the limits of the experiments); but the difference between the losses at low and high speeds was much less than it would have been had the resistance been, as Stokes has proved it to be, in fluid friction, approximately as the rapidity of the change of shape.

The irregularities in the results of the experiments which up to this time I have made seem to prove that much smaller vibrations (producing less absolute amounts of distortion in the part of the wires most strained) must be observed before any simple law of relation between molecular friction and velocity can be discovered.

(b) "When the weight was increased, the viscosity was always at first much increased; but then day after day it gradually diminished and became as small in amount as it had been with the lighter weight. It has not yet been practicable to continue the experiments long enough in any case to find the limit to this variation.

(c) "The vibration subsided in aluminium wires much more rapidly from amplitude 20 to amplitude 10, when the initial amplitude was 40, than when it was 20. Thus, with a certain aluminum wire, and vibrator No. 1 (tune of vibration one way 1 757 second), the number of vibrations counted were in three trials—

<table>
<thead>
<tr>
<th>Subsidence from initial amplitude</th>
<th>Vibration</th>
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<tbody>
<tr>
<td>to 10.</td>
<td>86 94 94</td>
</tr>
<tr>
<td>From 20 (in course of the same experiments)</td>
<td>98 98 98</td>
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<tr>
<td>No. 1</td>
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And the same wire and the vibrator showed—

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<tr>
<th>Subsidence from initial amplitude</th>
<th>Vibration</th>
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<tbody>
<tr>
<td>to 10.</td>
<td>96 98 98</td>
</tr>
<tr>
<td>From 20 to 10.</td>
<td>90 90</td>
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Again, the same wire, with vibrator No. 2 (tune of vibration one way 1 395), showed, in two trials—

<table>
<thead>
<tr>
<th>Subsidence from initial amplitude</th>
<th>Vibration</th>
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<tbody>
<tr>
<td>to 10.</td>
<td>54 53</td>
</tr>
<tr>
<td>From 20 to 10.</td>
<td></td>
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</table>

This remarkable result suggested the question (d).

(d) "In a wire which was kept vibrating nearly all day, from day to day, after several days very much molecular friction was found than in another kept quiescent except during each experiment. Thus two equal and similar pieces of copper wire were put up about the 26th of April, hanging with equal and similar lead weights, the upper and lower ends of the two wires being similarly fixed by soldering. No. 2 was more frequently vibrated than No. 1 for a few days at first, but no comparison of velocities was made till May 15. Then No. 1 subsided from initial range to 10 in 97 vibrations. No. 2 gave the same subsidence in 77 vibrations.

During the greater part of May 16 and 17, No. 2 was kept vibrating and No. 1 quiescent, and late on May 17 experiments with the following results were made:—

<table>
<thead>
<tr>
<th>Time per Vibration</th>
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<tbody>
<tr>
<td>No. 1 subsided from 20 to 10 after 99 vibrations in 237 sec.,</td>
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<tr>
<td></td>
</tr>
<tr>
<td>No. 2 subsided from 20 to 10 after 58 vibrations in 139 sec.,</td>
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[Addition, May 27, after the reading of the paper.—]

No. 1 has been kept at rest from May 17, while No. 2 has been kept oscillating more or less every day till yesterday, May 26, when both were oscillated, with the following results:—

<table>
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<tr>
<th>Time per Vibration</th>
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<tbody>
<tr>
<td>No. 1 subsided from 20 to 10 after 100 vibrations in 245 sec.,</td>
</tr>
<tr>
<td></td>
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</table>

35. The investigation was continued with much smaller degrees of maximum angular distortion, to discover, if possible, the law of the molecular friction, the existence of which was demonstrated by these experiments. Two questions immediately occurred.—What is the law of subsidence of range in any single series of oscillations, the vibrator being undisturbed by external forces (question (a) of § 33 above); what is the relation between the law of subsidence in two sets of oscillations having different periods, with the same elastic body in the same circumstances of elastic force, as for instance the same or similar metallic wires with equal weights hung upon them, performing torsional oscillations in different times on account of the moments of inertia of the suspended masses being different?

36 So far as the irregularities depending on previous conditions of the elastic substance allowed any simple law to be indicated, the experimental answer to the first question for degrees of angular distortion much smaller than the palpable limits of elasticity was the COMPOUND INTEREST LAW, that is to say,—The diminishments of range per equal intervals of time or per equal numbers of oscillations bore a constant proportion to the diminishing range, or, The differences of the logarithms of the ranges were proportional to the intervals of time.

The only approach to an answer to the second question yet obtained is that the proportionate losses of amplitude in the different cases are not such as they would be if the molecular resistance were simply proportional to the velocity of change of shape in the different cases. If the molecular friction followed this simple law, the proportionate diminutions of range per period would be inversely as the periods, or per equal intervals of time they would be inversely as the squares of the periods. Instead of the proportion being so, the loss was greater than the longer periods than that calculated according to the law of square roots from its amount in the shorter periods. It was in fact as it would be if the result were wholly or partially due to imperfect elasticity, or "elastische Nach-wirkung" — elastic after-working — as the Germans call it (compare section 6 above). To form a rough idea of the results, irrespectively of the ultimate molecular theory (which is to be looked for in the proper extension of Maxwell's kinetic theory of viscosity of gases), consider a perfectly elastic vesicular solid, whether like a sponge with communications between the vesicles, or with each vesicle separately inclosed in elastic solid: imagine its pores and interstices filled up with a viscous fluid, such as oil. Statical experiments will show perfect elasticity of bulk and shape; kinetic experiments will show losses of energy such as are really shown by vibrators of india-rubber, jelly, glass, metals, or other elastic homogeneous solids, but more regular, and following more closely the compound interest law for single series and the law of relation to square roots of periods stated above for sets of oscillations in different periods. In short, according to Stokes's law of viscosity of fluids, our supposed vesicular vibrator would follow the law of subsidence of a simple vibrator experiencing a resistance simply proportional to the velocity of its motion, while no such simple law is applicable to the effects of the internal molecular resistance in a vibrating elastic solid.

37. Hooke's Law.—A law expressed by Hooke with Latin terseness in the words Ut tensio sic vis is the foundation of the mathematical theory of the elasticity of hard solids. By tensio here is meant not force (as is generally meant by the English word tension), but an elongation produced by force. In English, then, Hooke's law is that elongation (understood of an elastic solid) is proportional to the force (or tension) acting on it. It is clear, however, to be extended continuously from elongation to contraction in respect to the effect, and from pull to push in respect.
to the cause; and the experiments on which it is founded prove a perfect continuity from the pulling force to a smaller force in the same direction, and from the less force to zero, and from zero of pulling force to different degrees of push or positive pressure, or negative pull. Experimental proof merely of the continuance of the phenomena through zero of force suffices to show that, for infinitely small positive or negative pull, positive or negative elongation is simply proportional to the positive or negative pull; or, in other words, positive or negative contraction is proportional to the positive or negative pressure producing it. But now must be invoked minutely accurate experimental measurement to find how near, as the force, is one proportion of the force, and this through finite ranges of contraction and elongation. The answer happily for mathematicians and engineers is that Hook's law is fulfilled, as accurately as any experiments hitherto made can tell, for all metals and hard solids each through the whole range within its limits of elasticity; and for woods, cork, india-rubber, jellies, when the elongation is not more than two or three per cent., or the angular distortion not more than a few hundredths of the radian (or not more than about two or three degrees). The same law holds for the condensation of liquids up to the highest pressures under which their compressibility has hitherto been accurately measured. [A decided but small deviation from Hooke's law has been found in steel pianoforte wire under combined influence of tension and longitudinal pull by Mr. Farlane in experiments made for the present article after this section was in type. See § 81.] Boyd's law of the "spring of air" shows that the augmentation of density of a gas is simply proportional to the augmentation of the pressure, through the very wide ranges of pressure through which that law is approximately enough fulfilled. Hence the infinitesimal diminution of volume produced by a given infinitesimal augmentation of pressure varies as the square of the volume, and this proportionate diminution of volume (that is to say, the ratio of the diminution of volume to the volume) is proportional to the volume, or inversely proportional to the density. Andrews's experiments on the compressibility of a fluid, such as carbonic acid, at temperatures slightly above the critical temperature, and of the gas and of liquids at temperatures slightly below the critical temperature, are intensely interesting, not merely in respect to the natural history of elasticity, but as opening vistas into the philosophy of molecular action.

We cannot expect to find any law of simple proportionality between stress and change of dimensions, or proportionate change of dimensions, in the case of any elastic or semi-elastic "soft" solids, such as cork on one hand or india-rubber or jellies on the other, when strained to large angular distortions, or to large proportionate changes of dimensions. The exceedingly imperfect elasticity of all these solids, and the want of definiteness of the substances of many of them, renders accurate experimenting unavailing for obtaining any very definite or consistent numerical results; but it is interesting to observe roughly the forces required to produce some of the great strains of which they are capable without any total break down of elastic quality; for instance, to hang weights successively on an india-rubber band and measure the elongations. This any one may readily do, and may be surprised to find the enormous increase of resistance to elongation presented by the attenuated band before it breaks.

38. Homogeneity Defined.—A body is called homogeneous when any two equal, similar parts of it, with corresponding lines parallel and turned towards the same parts, are undistinguishable from one another by any difference in quality. The perfect fulfilment of this condition, without any limit as to the smallness of the parts, though conceivable, is not generally regarded as probable, for any of the real solids or fluids known to us, however seemingly homogeneous. It is held by all naturalists that there is a molecular structure, according to which, in compound bodies such as water, ice, rock-crystal, &c., the constituent substances lie side by side, or arranged in groups of finite dimensions, and form in bodies called simple (that is those not known to be chemically resolvable into other substances) there is no ultimate homogeneity. In other words, the prevailing belief is that every kind of matter with which we are acquainted has a more or less coarse-grained texture, whether (as great masses of solid brick-work or stonework, or as natural sandstones or granite rocks) having visible molecules, or (as seemingly homogeneous metals, or continuous crystals, or liquids, or gases) having molecules too small to be directly visible, or measurable but not discoverably small,—really, it is to be believed, of dimensions to be accurately determined in future advances of science. Practically the definition of homogeneity may be applied on a very large scale to masses of building or coarse-grained conglomerate rock, or on a more moderate scale to blocks of common sandstone, or on a very small scale to seemingly homogeneous metals; on a scale of extremely undiscovered fineness, to vitreous bodies, continuous crystals, solidified gums, as india-rubber, gum-arabic, &c., and fluids.

39. Isotropic and Anisotropic Substances Defined.—The substance of a homogeneous solid is called isotropic when a spherical portion of it, tested by any physical agency, exhibits no difference in quality however it is turned, which amounts to the same, a cubical portion, cut from any position in an isotropic body, exhibits the same qualities relatively to each pair of parallel faces. Or two equal and similar portions cut from any positions in the body, not subject to the condition of parallellism (section 38), are undistinguishable from each other. A substance which is not isotropic, but exhibits differences of quality in different directions, is called anisotropic. The remarks of section 38 relative to homogeneity in the aggregate, and the supposed ultimately heterogeneous texture of all substances, however seemingly homogeneous, indicate corresponding limitations and non-rigorous practical interpretations of isotropy and anisotropy.

40. Isotropy and Anisotropy of Different Sets of Properties.—The substance of a homogeneous solid may be isotropic in one quality or class of qualities, but anisotropic in others. Or a transparent substance may transmit light at different velocities in different directions through it (that is, be doubly-refracting), and yet a cube of it may (and does in many natural crystals) show no sensible difference in its absorption of white light transmitted across it perpendicularly to any of its three pairs of faces. Or (as a crystal which exhibits dichroism) it may be sensibly anisotropic relatively to the absorption of light, but not sensibly doubly-refracting, or it may be dichroic and double-refracting, and yet it may conduct heat equally in all directions. Still, as a rule, a homogeneous substance which is anisotropic for one quality must be more than infinitesimally anisotropic for every quality which has directional character adorning of a corresponding anisotropy.

41. Moduli of Elasticity.—A modulus of elasticity is the number obtained by dividing the number expressing a stress by the number expressing the strain which it produces. A modulus is called a principal modulus when
the stress is such that it produces a strain of its own type.

(1) An isotropic solid has two principal moduluses—a modulus of compression and a rigidity.

(2) A crystal of the cube class (fluor-spar, for instance) has three principal moduluses—one modulus of compression and two rigidities.

(3) An anisotropic solid having (what no natural crystal has, but what a drawn wire has) perfect isotropy of physical qualities relative to all lines perpendicular to a certain axis of its substance has three principal moduluses, two determinable from its different compressibilities along and perpendicular to the axis, or from one compressibility and the "Young's modulus" (section 42) of an axial bar of the substance, or determinable from two compressibilities; and one rigidity determinable by measurement of the torsional rigidity of a round axial bar of the substance.

(4) A crystal of Iceland spar has four principal moduluses, three like those of case (3), and another rigidity depending on (want of complete circular symmetry, and possession of triaxial symmetry of form, involving sextuple elastic symmetry, round the crystalline axis.

(5) A crystal of the rectangular parallelepiped (or "teessarid") class has six distinct principal moduluses which, when the directions of the principal axes are known, are determinable by six single observations,—three of the three (generally unequal) compressibilities along the three axes; and three of the three rigidities (no doubt generally unequal) relatively to the three simple distortions of the parallelepipeds, in any one of which one pair of parallel rectangular faces of the parallelepiped become oblique parallelograms.

(6) An anisotropic solid generally has six principal moduluses, which, when a piece of the solid is presented without information, and without any sure indication from its appearance of any particular axis or axes of symmetry of any kind, require just twenty-one independent observations for the determination of the fifteen quantities specifying their types, and the six numerical values of the moduluses themselves.

42. "Young's Modulus," or Modulus of Simple Longitudinal Stress.—Thomas Young called the modulus of elasticity of an elastic solid the amount of the end-pull or end-thrust required to produce any infinitesimal elongation or contraction of a wire, or bar, or column of the substance multiplied by the ratio of its length to the elongation or contraction. In this definition the definite article is clearly missing. There are, as we have seen, two moduluses of elasticity for an isotropic solid,—one measuring elasticity of bulk, the other measuring elasticity of shape. An interesting and instructive illustration of the confusion of ideas so often rising in physical science from faulty logic is to be found in an Account of an Experiment on the Elasticity of Ice: By Benjamin Bevan, Esq., in a letter to Dr Thomas Young, Foreign Sec. R. S.," and in Young's "Note" upon it, both published in the Transactions of the Royal Society for 1826. Bevan gives an interesting account of a well-designed and well-executed experiment on the flexure of a bar, 3.97 inches thick, 10 inches broad, and 100 inches long, of ice on a pond near Leighton Buzzard (the bar remaining attached by one end to the rest of the ice, but being cut free by a saw along its sides and across its other end), by which he obtained a fairly accurate determination of "the modulus of ice," and says that he repeated the experiment in various ways on ice bars of various dimensions, some remaining attached by

one end, others completely detached, and found results agreeing with the first as nearly as "the admission of the thickness could be ascertained." He then proceeds to compare "the modulus of ice" which he had thus found with "the modulus of water," which he quotes from Young's Lectures as deduced from Canton's experiments on the compressibility of water. Young in his "Note" does not point out that the two moduluses were essentially different, and that the modulus of his definition, the modulus determinable from the flexure of a bar, is essentially zero for every fluid. We now call "Young's modulus" the particular modulus of elasticity defined as above by Young, and so avoid all confusion.

43. Modulus of Rigidity.—The "modulus of rigidity" of an isotropic solid is the amount of tangential stress divided by the deformation it produces,—the former being measured in units of force per unit of the area to which it is applied in the manner indicated by the annexed diagram (fig. 3), and the latter by the variation of each of the four right angles reckoned in fraction of the radian. By drawing either diagonal of the square in the diagram we see that the deforming stress represented by it gives rise to a normal traction on every surface of the substance perpendicular to the square and parallel to one of its diagonals, and an equal normal pressure on every surface of the solid perpendicular to the square and parallel to the other diagonal, and that the amount of each of these normal forces per unit of area is equal to the amount per unit area of the tangential forces which the diagram indicates. The corresponding geometrical proposition, also easily proved, is as follows: A strain compounded of a sample extension in one set of parallels, and a sample contraction of equal amount in any other set perpendicular to those, is the same as a simple shear in either of the two sets of planes cutting the two sets of parallels at 45°, and the numerical measuring of this shear or simple distortion is equal to double the amount of the elongation or contraction, each reckoned per unit of length.

Hence we have another definition of "modulus of rigidity" equivalent to the preceding:—The modulus of rigidity of an isotropic substance is the amount of normal traction or pressure per unit of area, divided by twice the amount of elongation in the direction of the traction or contraction in the direction of the pressure, when a piece of the substance is subjected to a stress producing uniform distortion.

44. Conditions fulfilled in Elastic Isotropy.—To be elastically isotropic, a spherical or cubical portion of any solid, if subjected to uniform normal pressure (positive or negative) all round, must, in yielding, experience no deformation, and therefore must be equally compressed (or dilated) in all directions. But, further, a cube cut from any position in it, and acted on by tangential or distorting stress in planes parallel to two pairs of its sides, must experience simple deformation, or "shearing" parallel to either pair of these sides, unaccompanied by condensation or dilatation, 6

6 The directions of these forces are called the "axes" of the stress. The corresponding directions in the corresponding strain are called the "axes of the strain.

6 Mathematical Theory, chap. vi.

7 This, with several of the following sections, 44-51, is borrowed, with but slight change, from the first edition of Thomson and Tait's Natural Philosophy, by permission of the authors.

8 It must be remembered that the changes of figure and volume we are concerned with are so small that the principle of superposition is
and the same in amount for all the three ways in which a stress may be thus applied to any one cube, and for different cubes taken from any different positions in the solid. Hence the elastic quality of a perfectly elastic, homogeneous, isotropic solid is fully defined by two elements,—its resistance to distortion and its resistance to compression. The first has been already considered (section 43). The second is measured by the amount of uniform pressure in all directions per unit area of its surface required to produce a stated very small compression. The numerical reckoning of the first is the compressing pressure divided by the diminution of the bulk of a portion of the substance which, when uncompressed, occupies the unit volume. It is sometimes called the "elasticity of bulk," or sometimes the "modulus of bulk-elasticity," sometimes the "modulus of the longitudinal dilatation," sometimes the "cubic dilatation," and sometimes the "modulus of longitudinal dilatation," each reckoned as usual per unit of linear measure. One specimen of the fallacious mathematics referred to in chap. xvi. of the mathematical theory below is a celebrated conclusion of Navier's and Poisson's that the ratio of lateral contraction to elongation by pull without transverse force is \( \frac{1}{2} \). This would require the rigidity to be \( \frac{1}{2} \) of the resistance to compression, for all solids; which was first shown to be false by Stokes in many obvious observations, proving enormous discrepancies from it in many well-known bodies, and rendering it most improbable that there is any approach to a constancy of ratio between rigidity and resistance to compression in any class of solids. Thus clear elastic jellies and India-rubber present familiar specimens of isotropic homogeneous solids which, while differing very much from one another in rigidity ("stiffness"), are probably all of very nearly the same compressibility as water, which is about \( \frac{1}{6000} \) per atmosphere. Their resistance to compression, measured by the reciprocal of this, is obviously many hundred times the absolute amount of the rigidity of the stiffest of those substances. A column of any of them, therefore, when pressed together or pulled out, within its limits of elasticity, by balancing forces applied to its ends (or an India-rubber band when pulled out), experiences no sensible change of volume, though very sensible change of length. Hence the proportionate extension or contraction of any transverse diameter must be sensibly equal to half the longitudinal contraction or extension; and such substances may be practically regarded as incompressible elastic solids in interpreting all the phenomena for which they are most remarkable. Stokes gave reasons for believing that metals also have in general greater resistance to compression, in proportion to their rigidities, than according to the fallacious theory, although for them the discrepancy is very much less than for the gelatinous bodies. This probable conclusion was soon experimentally demonstrated by Wertheim, who found the ratio of lateral to longitudinal change of lineal dimensions, in columns acted on solely by longitudinal force, to be about \( \frac{1}{2} \) for glass and brass; and by Kirchhoff, who, by a well-devised experimental method, found \( \frac{877}{500} \) as the value of that ratio for brass, and \( \frac{234}{500} \) for iron. For copper it is shown to lie between \( \frac{236}{500} \) and \( \frac{441}{500} \), by experiments quoted below, measuring the torsional and longitudinal rigidities of copper wires.

45. Strains produced by a single Longitudinal Stress (subject of Young's Module.)—Any stress whatever may be made up of simple longitudinal stresses. Hence, to find the relation between any stress and the strain produced by it, we have only to find the strain produced by a simple longitudinal stress, which, for an isotropic solid, we may do at once thus:—A single longitudinal stress \( P \) is equivalent to a uniform dilating tension \( \frac{1}{2} P \) in all directions, compounded with two distorting stresses, each equal to \( \frac{1}{2} P \), and having a common axis in the line of the given longitudinal stress, and their other two axes any two lines at right angles to one another and to it.

The diagram (fig. 4), drawn in a plane through one of the latter lines and the former, sufficiently indicates the synthesis,—the only forces not shown being those perpendicular to its plane.

Hence if \( n \) denote the rigidity, and \( k \) the modulus of compressibility, or the modulus of bulk-elasticity (being the same as the reciprocal of the compressibility), the effect will be an equal dilatation in all directions, amounting, per unit of volume, to

\[
\frac{1}{k}
\]

and having (section 43, footnote) their axes in the directions just stated for the axes of the distorting stresses.

46. The dilatation and shears thus determined may be conveniently reduced to simple longitudinal strains by following the indications of section 43, thus:—The two shears together constitute an elongation amounting to \( \frac{1}{2} P \) in the direction of the given force \( P \), and equal contraction amounting to \( \frac{1}{k} \) in all directions perpendicular to it. And the cubic dilatation \( \frac{1}{k} \) implies a linear dilatation, equal in all directions, amounting to \( \frac{1}{k} \).

On the whole, therefore, we have

- Linear elongation \( \frac{1}{k} \) in the direction of the applied stress, and
- Linear contraction \( \frac{1}{k} \) in all directions perpendicular to the applied stress.

47. Hence "Young's Modulus" = \( \frac{1}{k} \), and when the ends of a column, bar, or wire of isotropic material are acted on by equal and opposite forces, it experiences a lateral linear contraction equal to \( \frac{1}{k} \) of the longitudinal dilatation, each reckoned as usual per unit of linear measure. One specimen of the fallacious mathematics referred to in chap. xvi. of the mathematical theory below is a celebrated conclusion of Navier's and Poisson's that the ratio of lateral contraction to elongation by pull without transverse force is \( \frac{1}{2} \). This would require the rigidity to be \( \frac{1}{2} \) of the resistance to compression, for all solids; which was first shown to be false by Stokes in many obvious observations, proving enormous discrepancies from it in many well-known bodies, and rendering it most improbable that there is any approach to a constancy of ratio between rigidity and resistance to compression in any class of solids. Thus clear elastic jellies and India-rubber present familiar specimens of isotropic homogeneous solids which, while differing very much from one another in rigidity ("stiffness"), are probably all of very nearly the same compressibility as water, which is about \( \frac{1}{6000} \) per atmosphere. Their resistance to compression, measured by the reciprocal of this, is obviously many hundred times the absolute amount of the rigidity of the stiffest of those substances. A column of any of them, therefore, when pressed together or pulled out, within its limits of elasticity, by balancing forces applied to its ends (or an India-rubber band when pulled out), experiences no sensible change of volume, though very sensible change of length. Hence the proportionate extension or contraction of any transverse diameter must be sensibly equal to half the longitudinal contraction or extension; and such substances may be practically regarded as incompressible elastic solids in interpreting all the phenomena for which they are most remarkable. Stokes gave reasons for believing that metals also have in general greater resistance to compression, in proportion to their rigidities, than according to the fallacious theory, although for them the discrepancy is very much less than for the gelatinous bodies. This probable conclusion was soon experimentally demonstrated by Wertheim, who found the ratio of lateral to longitudinal change of lineal dimensions, in columns acted on solely by longitudinal force, to be about \( \frac{1}{2} \) for glass and brass; and by Kirchhoff, who, by a well-devised experimental method, found \( \frac{877}{500} \) as the value of that ratio for brass, and \( \frac{234}{500} \) for iron. For copper it is shown to lie between \( \frac{236}{500} \) and \( \frac{441}{500} \), by experiments quoted below, measuring the torsional and longitudinal rigidities of copper wires.

48. All these results indicate rigidity less in proportion to the compressibility than according to Navier's and Poisson's theory. And it has been supposed by many naturalists who have seen the necessity of abandoning that theory as inapplicable to ordinary solids that it may be regarded as the proper theory for an ideal perfect solid, and as indicating an amount of rigidity not quite reached in any real substance, but approached to in some of the

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1 Mathematical Theory, chap. xvi.
3 "On the Elasticity and Viscosity of Metals" (W. Thomson), Proc. R. S., May 1865.
most rigid of natural solids (as, for instance, iron). But it is scarcely possible to hold a piece of cork in the hand without perceiving the fallaciousness of the last attempt to maintain a theory which never had any good foundation. By careful measurements on columns of cork of various forms (among them, cylindrical pieces cut in the ordinary way for bottles), before and after compressing them longitudinally in a Brann's press, we have found that the change of lateral dimensions is inelastic both with small longitudinal contractions and return dilations, within the limits of elasticity, and with such enormous longitudinal contractions as to $\frac{1}{4}$ or $\frac{1}{2}$ of the original length. It is thus proved decisively that cork is much more rigid, while metals, glass, and gelatinous bodies are all less rigid, in proportion to resistance to compression, than the supposed "perfect solid"; and the practical invalidity of the theory is experimentally demonstrated. By obvious mechanism of jointed bars a solid may be compressed, in one direction, and with such enormous lateral contractions as to $\frac{1}{4}$ or $\frac{1}{2}$ of the original length. Thus we have

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It is to be understood that the vibrations in question are so much spread out through the lengths and the breadth of the body that mass does not enter...
veniently large numbers expressing moduli in grammes weight per square centimetre, but it is much better to reckon in millions of grammes per square centimetre.

52. "Resilience" is a very useful word, introduced about forty years ago (when the doctrine of energy was beginning to become practically appreciated) by Lewis Gordon, first professor of engineering in the university of Glasgow, to denote the quantity of work that a spring (or elastic body) gives back when strained to some stated limit and then allowed to return to the condition in which it rests when free from stress. The word "resilience" used without special qualification may be understood as meaning extreme resilience, or the work given back by the spring after being strained to the extreme limit within which it can be strained again and again without breaking or taking a permanent set. In all cases for which Hooke's law of simple proportionality between stress and strain holds, the resilience is obviously equal to the work done by a constant force of half the amount of the extreme force acting through a space equal to the extreme deflection.

53. When force is reckoned in "gravitation measure," resilience per unit of the spring's mass is simply the height that the spring itself, or an equal weight, could be lifted against gravity by an amount of work equal to that given back by the spring returning from the stresses over which it has been strained. Hence when we imagine the bar divided lengthwise and let the stress for which its resilience is allowed to return to the condition in which it rests when free from stress. The word "resilience" used without special qualification may be understood as meaning extreme resilience, or the work given back by the spring after being strained to the extreme limit within which it can be strained again and again without breaking or taking a permanent set. In all cases for which Hooke's law of simple proportionality between stress and strain holds, the resilience is obviously equal to the work done by a constant force of half the amount of the extreme force acting through a space equal to the extreme deflection.

54. Let the elastic body be a long homogeneous cylinder or prismatic with flat ends (a bar as we may call it for brevity), and let the stress for which its resilience is reckoned be *positive* normal pressures on its ends. The resilience per unit mass is equal to the greatest height from which the bar can fall with its length vertical, and impinge against a perfectly hard horizontal plane without suffering stress beyond its limits of elasticity. For in this case (as in the case of the direct impact of two equal and similar bars meeting with equal and opposite velocities, discussed in Thomson and Tait's *Natural Philosophy*, section 502), the kinetic energy of the translational motion proceeding the impact is, during the first half of the collision, wholly converted into potential energy of elastic force, which during the second half of the collision is wholly reconverted into kinetic energy of translational motion in the reverse direction. During the whole time of the collision the stopped end of the bar experiences a constant pressure, and at the middle of the collision the whole substance of the bar is for an instant at rest in the same state of compression as it would have permanently if in equilibrium under the influence of that pressure and an equal and opposite pressure at the other end. From the beginning to the middle of the collision the compression advances at a uniform rate through the bar from the stopped end to the free end. Every particle of the bar which the compression has not reached continues moving uniformly with the velocity of the waves before the collision until the compression reaches it, when it instantaneously comes to rest. The part of the bar which at any instant is all that is compressed remains at rest till the corresponding instant in the second half of the collision.

55. From our preceding view of a bar impinging against an ideal perfectly rigid plane, we see at once all that takes place in the real case of any rigorously direct longitudinal collision between two equal and similar elastic bars with flat ends. In this case the whole of the kinetic energy which the bodies had before collision reappears as purely translational kinetic energy after collision. The same would be approximately true even for any two bars, provided the time taken by a pulse of simple longitudinal stress to run through their lengths are equal. Thus if the two bars be of the same substance, or of different substances having the same value for Young's modulus, the lengths must be equal, but the diameters may be unequal. Or if the Young's modulus be different in the two bars, their lengths must (Math. Theory, chap. xvii.) be inversely as the square roots of its values. To all such cases the laws of "collision between two perfectly elastic bodies," whether of equal or unequal masses, as given in elementary dynamical treatises, are applicable. But in every other case part of the translational energy which the bodies have before collision is left in the shape of vibrations after collision, and the translational energy after collision is accordingly less than before collision. The losses of energy observed in common elementary dynamical experiments on collision between solid globes of the same substance are partly due to this cause. If they were wholly due to it they would be independent of the substance, when two globes of the same substance are used. They would bear the same proportion to the whole energy in every case of collision between two equal globes, or again, in every case of collision between two globes of any stated proportion of diameters, provided in each case the two which collide are of the same substances; but the proportion of translational energy converted into vibrations would not be the same for two equal globes as for two unequal globes. Hence when differences of proportionate losses of energy are found in experiments on different substances, as in Newton's on globes of glass, iron, or compressed wool, this must be due to imperfect elasticity of the material. It is to be expected that careful experiments upon hard well-polished globes striking one another with such gentle forces as not to produce even at the point of contact any stress approaching to the limit of elasticity, will be found to give results in which the observed loss of translational energy can be almost wholly accounted for by vibrations remaining in the globes after collision.

56. Examples of Resilience.—Example 1.—In respect to simple longitudinal pull, the extreme resilience of steel pianoforte wire of the gauge and quality referred to in section 22 above (calculated by means of the breaking weight into half the elongation produced by it according to the experimental data of section 22) is 6056 metre-grammes (gravitation measure) per ten metres of the wire. Or, whatever the length of the wire, its resilience is equal to the work required to lift its weight through 172 metres.

Example 2.—The torsional resilience of the same wire, twisted in either direction as far as it can be without giving it any notable permanent set, was found to be equal to the work required to lift its weight through 13 metres.

Example 3.—The extreme resilience of a vulcanized india-rubber band weighing 12·3 grammes was found to be equal to the work required to lift its weight through 1200 metres. This was found by stretching it by gradations of weights up to the breaking weight, representing the results by aid of a curve, and measuring its area to find the integral work given back by the spring after being stretched by a weight just short of the breaking weight.

57. Flexure of a Beam or Rod.—In the problem of simple flexure a bar or uniform rod or wire, straight when free from stress, is kept in a circular form by equal opposing couples properly applied to its ends. The parts of the bar on the convex side of the circle must obviously be stretched longitudinally, and those on the concave side contracted longitudinally, by the flexure. It is not obvious, however, what are the conditions affecting the lateral shrinkings and swellings of ideal filaments into which we may imagine the bar divided lengthwise. Earlier writers had assumed with perfect reason that each filament, bent as it is in its actual position in the bar, is elongated or contracted by the same amount as it would be if it were detached, and subjected to the same end pull or end compression with its sides quite free to shrink or
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expand, but they had taken no account of the lateral shrinking or swelling which the filament must really experience in the bent bar. The subject first received satisfactory mathematical investigation from St Venant. He proved that the old supposition is substantially correct, with the important practical exception of the flat spring referred to in section 59 below. His theory shows that, in fact, if we imagine the whole rod divided parallel to its length into infinitesimal filaments, each of these shrinks or swells laterally with sensibly the same freedom as if it were separated from the rest of the substance and subjected to end pull or end compression, lengthening or shortening it in a straight line to the same extent as it is really lengthened or shortened in the circular arc which it becomes in the lateral with sensibly the same freedom as if it were.

The importancy of the angular beam, or a rectangular area in the normal section of a beam of any figure, is indicated, but too far to be included in the diagram of section 57. For unless the planed bar (or diameter perpendicular to the plane of flexure) be very small in comparison with the mean proportional between the radius OH and the thickness AB the distances from YY to the corners A', C', would fall short of the half thickness, OE, and the distances to B', D', would exceed it, by differences comparable with its own amount. This would give rise to sensibly less and greater shortenings and stretchings in the filaments towards the corners than those supposed in the ordinary calculation of flexural rigidity (article 61), and so vitiate the result. Unhappily, mathematicians have not hitherto succeeded in solving, possibly not even tried to solve, the beautiful problem thus presented by the flexure of a broadly thin band (such as a watch spring) into a circle of radius comparable with a third proportional to its thickness and its breadth.

60. But, provided the radius of curvature of the flexure is not only a large multiple of the greatest diameter, but also of a third proportional to the diameters in and perpendicular to the plane of flexure; then, however great may be the ratio of the greatest diameter to the least, the preceding solution is applicable, and it is remarkable that the necessary distortion of the normal section (illustrated in the diagram of article 57) does not sensibly impede the free lateral contractions and expansions in the filaments, even in the case of a broad thin lamina (whether of precisely rectangular section, or of unequal thicknesses in different parts). No. 61.

Flexural Rigidities of a Rod or Beam.-The example required to give unit curvature in any plane to a rod or beam is called its flexural rigidity for curvature in that plane. When the beam is of circular cross section and of isotropic material, the flexural rigidity is clearly the same, whatever be the plane of flexure through the axis, and the plane of the bending couple coincides with the plane of flexure. It might be expected that in a round bar of isotropic material, such as a wooden rod with the annual woody layers sensibly plane and parallel to a plane through its axis, would show different flexural rigidities in different planes,—in the case of wood, for example, different according as the flexure is in a parallel or perpendicular to the annual layers. This is not so, however; on the contrary, it is easy to show, by an extension of St Venant's theory, that in the case of the wooden rod the flexural rigidity is equal in all planes through the axis, and that the plane of flexure always agrees with the plane of the bending couple, and to prove generally that the flexure of a bar of isotropic substance, and composed it may be of longitudinal filaments of heterogeneous materials, is precisely the same as if it were isotropic, and that its flexural rigidities are calculated by the same rule from its Young's modulus, provided that the anisotropy is not such as (section 81) to give rise to alteration of the angle between the length and any diameter perpendicular to the length when weight is hung on the rod, or on any longitudinal filament cut from it. Excluding then all cases in which there is any such oblique anisotropy, we have a very simple theory for the flexure of bars of any substance, whether isotropic or anisotropic, and whether homogeneous or not homogeneous through the cross section.

62. Principal Flexural Rigidities and Principal Planes of Flexure of a Beam.—The flexural rigidity of a rod is generally not equal in different directions, and the plane of flexure does not generally coincide with the plane of the bending couple. Thus a flat ruler is much more easily bent in a plane perpendicular to its breadth than in the plane of its breadth; and if we apply opposing couples to its two ends in any plane through its axis not either perpendicular or parallel to its breadth, it is obvious that the plane in which the flexure takes place will be more inclined to the plane of the breadth than to the plane of the bending couple. Very elementary statical theory, founded on St.
Venant's conclusions of section 57, shows that, whatever the shape and the distribution of matter in the cross section of the bar, there are two planes at right angles to one another such that if the bar be bent in either of these planes the bending couple will coincide with the plane of those planes, and the rigidity of the bar for flexure in these planes are called its principal flexural rigidities. When the principal flexural rigidities are known the flexure of the bar in any plane oblique to the principal planes is readily found by supposing to be bent in one of the principal planes and simultaneously in the other, and calculating separately the couples required to produce these two component flexures. The positions of the principal planes of flexure, the relative flexural rigidities, and the law of elongation and contraction in different parts of the cross section, are found according to the following simple rules:

(1) Imagine an infinitely thin plane disc of the same shape and size as the cross section loaded with matter in simple proportion to the Young's modulus in different parts of the disc. Then the quantity of matter per unit area on any point of the disc be equal to the Young's modulus on the corresponding point of the rod when the material is homogeneous; on the other hand, when the material is homogeneous it is more convenient to call the quantity of matter unity per unit area of the disc. Considering different axes in the plane of the disc through the centre of inertia, find the two principal axes of greatest and least moments of inertia, and find the moments of inertia round them.

(2) In whatever plane the bar be bent it will experience neither elongation nor contraction in the filament which passes through the centre of inertia of the cross sections found according to rule (1), nor in the diameter of the cross section perpendicular to the plane of flexure.

(3) Thus all the particles which experience neither elongation nor contraction lie in a surface cutting the plane of flexure perpendicularly through the centres of inertia of the cross sections. All the material on the outside of this cylindrical surface is elongated, and all on the interior of it is contracted, in simple proportion to distance from it: the amount of the elongation or contraction being in fact equal to distance from this neutral surface divided by the radius of its curvature.

(4) Hence it is obvious that the portions of the solid on the two sides of any cross section most experience mutual normal forces, pulling them towards each other in the stretched part, and pressing them from one another in the condensed part, and that the amount of this negative or positive normal pressure per unit of area would be equal to the Young's modulus at the place, multiplied into the ratio of its distance from the neutral line of the cross section to the radius of curvature.

The sum of these positive and negative forces over the whole area of the cross section is zero in virtue of condition (3). Their couple resultant has its axis perpendicular to the plane of curvature when this line is either of the principal axes (3) of the cross section; and its moment is clearly equal to the moment of inertia of the material disc (1) divided by the radius of curvature. Hence the principal flexural rigidities are simply equal to the principal moments of inertia of this disc; and the principal flexural planes are the planes through its principal axes and the length of the bar; or taking the quantity of matter per unit area of the disc unity for the case of a homogeneous bar, we have the rule that the principal rigidities are equal to the product of the Young's modulus into the principal moments of inertia of the cross sectional areas, and the principal planes of flexure are the longitudinal planes through the principal axes of this area.

53. Law of Torsion.—One of the most beautiful applications of the general equations of internal equilibrium of an elastic solid hitherto made is that of M. de St Venant to "the torsion of prisms." In this work the mathematical methods invented by Fourier for the solution of problems regarding conduction of heat have been most ingeniously and happily applied by St Venant to the problem of torsion. To reproduce St Venant's mathematical investigation here would make this article too long (it occupies 237 quarto pages of the Mémoires des Savants Étrangers); but a statement of some of the chief results is given (sections 65–72), not only on account of their strong scientific interest, but also because they are of great practical value in engineering; and the reader is referred to Thomson and Tait's *Natural Philosophy*, sections 700–710, for the proofs and for further details regarding results, but much that is valuable and interesting is only to be found in St Venant's original memoir.

64. Torsion Problem stated and Torsional Rigidity defined.—To one end of a long, straight prismatic rod, wire, or solid or hollow cylinder of any form, a given couple is applied in a plane perpendicular to the length, while the other end is held fast: it is required to find the degree of twist produced, and the distribution of strain and stress throughout the prism. The moment of the couple divided by the amount of the twist per unit length is called the torsional rigidity of the rod or prism. This definition is founded simply on the extension of Hooke's law to torsion discovered experimentally by Coulomb, according to which a rod or wire when twisted within limits of torsional elasticity exerts a reactive couple in simple proportion to the angle through which one end is turned relatively to the other. The integral of the external conditions to be satisfied in the torsion problem are that the resultant action between the two sides of any normal section is a couple, in the normal plane, equal to the given couple. This problem has not hitherto been attacked for anisotropic solids. Even such a case as that of the round wooden rod (section 61) with annular layers sensibly parallel to a plane through its length, will, when twisted, experience a distribution of strain complicated much by its anisotropy. The following statements of results are confined to rods of isotropic material.

65. Torsion of Circular Cylinder.—For a solid or hollow circular cylinder, the solution (given first, we believe, by Coulomb) obviously is that each circular normal section remains unchanged in its own dimensions, figure, and internal arrangement (so that every straight line of its particles remains a straight line of unchanged length), but is twisted round the axis of the cylinder through such an angle as to give a uniform rate of twist equal to the applied couple divided by the product of the moment of inertia of the circular area (whether annular or complete to the centre) into the modulus of rigidity of the substance.

For, if we suppose the distribution of strain thus specified to be actually produced, by whatever application of stress is necessary, we have, in every part of the substance, a simple shear parallel to the normal section, and perpendicular to the radius through it. The elastic reaction against this requires, to balance it (section 43), a simple distorting stress consisting of forces in the normal section, directed as the shear, and others in planes through the axis, and directed parallel to the axis. The amount of the shear is, for parts of the substance at distance \( r \) from the axis, equal obviously to \( \tau r \), where \( \tau \) be the rate of twist reckoned in radians per unit of length of the cylinder. Hence the amount of the tangential force in either set of planes is numerically equal to the rigidity of the substance. Hence there is no force between parts of the substance lying on the two sides of any element of any circular cylinder coaxal with the bounding cylinder or cylinders; and consequently no force is required on the cylindrical boundary to maintain the supposed state of strain. And the mutual section between the parts of the substance on the two sides of any normal plane section consists of force in this plane, directed perpendicular to the radius through each point, and amounting to \( \tau r \) per unit of area. The moment of this distribution of force round the axis of the cylinder is (if \( d \) denote an element of the area) \( \tau dA \), or the
product of \( r \) into the moment of inertia of the area round the perpendicular to its plane through its centre, which is therefore equal to the moment of the couple applied at any end.

66. Prisms of any shape constrained to a Simple Torsion.—Further, it is easily proved that if a cylinder or prism of any shape be compelled to take exactly the state of strain above specified (section 65) with the line through the centres of inertia of the normal sections, taken instead of the axis of the cylinder, the mutual action between the parts of \( r \) on the two sides of any normal section will be a couple of the moment of inertia of the section round its centre, the two sides of any normal section will be a couple of the moment of inertia of the section round its centre. But for any other shape of prism than a solid or symmetrical hollow circular cylinder, the supposed state of strain requires, besides the terminal opposed couples, force parallel to the length of the prism, distributed over the prismatic boundary, in proportion to the distance of each in the tangent, from each point of the surface, to the point in which this line is cut by a perpendicular to \( r \) from \( O \) the centre of inertia of the normal section. To prove this let a normal section of the prism be represented in the annexed diagram (fig. 6) by \( PK \), representing the shear at any point \( P \), close to the prismatic boundary, be resolved into \( FN \) and \( PT \) parallel to the normal and tangent respectively. The whole, shear \( PK \) being equal to \( r \), its component \( FN \) is equal to \( r \) \( \sin \theta \) or \( r \) \( PE \). The corresponding component of the required stress is \( r \) \( PE \), and involves equal forces in the plane of the diagram, and in the plane through \( TP \) parallel to \( r \), each amounting to \( r \) \( PE \) per unit of area.

An application of force equal and opposite to the distribution thus found over the prismatic boundary, would of course alone produce in the prism, otherwise free, a state of strain which, compounded with that supposed above, would give the state of strain actually produced by the sole application of balancing couples to the two ends. The result, it is easily seen, consists of an increased twist, together with a warping of normally plane normal sections, by infinitesimal displacements perpendicular to themselves, into certain surfaces of antileastic curvature, with equal opposite curvatures. In bringing forward this theory, St Venant pointed out the falsity of the assumption admitted by several previous writers, and used in practice fallaciously by engineers, that Coulomb’s law holds for other forms of prism than the solid or hollow circular cylinder, but he discovered fully the nature of the requisite correction, reduced the determination of its action to a problem of pure mathematics, worked out the solution for a great variety of important and curious cases, compared the results with observation in a manner satisfactory and interesting to the naturalist, and gave conclusions of great value to the practical engineer.

67. Hydrokinetic Analogue to Torsion Problem.—We take advantage of the identity of mathematical conditions in St Venant’s torsion problem, and a hydrokinetic problem first solved a few years earlier by Stokes, to give the following statement, which will be found very useful in estimating deficiencies in torsional rigidity below the amount calculated from the fallacious extension of Coulomb’s law:

“Conceive a liquid of density \( \rho \) completely filling a closed infinitely light prismatic box of the same shape within as the given elastic prism and of length unity, and let a couple be applied to the box in a plane perpendicular to its length. The effective moment of inertia of the liquid will be equal to the correction by which the torsional rigidity of the elastic prism, calculated by the false extension of Coulomb’s law, must be diminished to give the true torsional rigidity. Further, the actual shear of the solid, in any infinitely thin plate of \( r \) between two normal sections, will at each point be, when reckoned as a differential sliding (section 43) parallel to their planes, equal to and in the same direction as the velocity of the liquid relatively to the containing box.”

68. Solution of Torsion Problem.—To prove these propositions and investigate the mathematical equations of the problem, the process followed in Thomson and Tait’s Natural Philosophy, section 706, is first to show that the conditions of sections 63 are verified by a state of strain compounded of (1) a simple twist round the line through the centre of inertia, and (2) a distortion of each normal section by infinitesimal displacements perpendicular to its plane; then find the interior and surface equations to determine this warping, and lastly, calculate the actual moment of the couple to which the mutual action between the matter on the two sides of any normal section is equivalent.

In the following are selected...

(1) Elliptic Cylinder.—The plane and dotted curvilinear area are (fig. 7) “contour lines” (coupes topographiques) of the section as warped by torsion; that is to say, lines in which it is cut by a series of parallel planes, each perpendicular to the axis. The arrows indicate the direction of rotation in the part of the prism above the plane of the diagram.
(2.) Contour lines for St Venant's "étoile à quatre points arrondis."—This diagram (fig. 8) shows the contour lines, in all respects as in case (1), for the case of a prism having for section the figure indicated. The portions of curves outside the continuous closed curve are merely indications of mathematical extensions irrelevant to the physical problem.

(3.) Contour lines of normal section of triangular prism, as warped by torsion, shown as in case (1) (fig. 9).

(4.) Contour lines of normal sections of square prisms, as warped by torsion (fig. 10).

(5.) Diagram of St Venant's curvilinear squares for which torsion problem is algebraically soluble.—This diagram (fig. 11) shows the series of lines represented by the equation \( z^2 + y^2 - \alpha(z^2 - 6z^2 + y^2) = 1 - \alpha \), with the indicated values for \( \alpha \). It is remarkable that the values \( \alpha = 0.5 \) and \( \alpha = -\frac{1}{2}(\sqrt{2} - 1) \) give similar but not equal curvilinear squares (hollow sides and acute angles), one of them turned through half a right angle relatively to the other.

70. Torsional Rigidity less in proportion to sum of principal Flexural Rigidity than according to false extension (section 66) of Coulomb's Law.—Inasmuch as the moment of inertia of a plane area about an axis through its centre of inertia perpendicular to its plane is obviously equal to the sum of its moments of inertia round any two axes through the same point at right angles to one another in its plane, the fallacious extension of Coulomb's law, referred to in section 66, would make the torsional rigidity of a bar of any section equal to the product of the ratio of the modulus of rigidity to the Young's modulus into the sum of its flexural rigidities (section 61) in any two planes at right angles to one another through its length.

The true theory, as we have seen (section 67), always gives a torsional rigidity less than this. How great the deficiency may be expected to be in cases in which the figure of the section presents projecting angles, or considerable prominences (which may be imagined from the hydrokinetic analogy given in section 67), has been pointed out by M. de St Venant, with the important practical application, that strengthening ribs, or projections (see, for instance, the second of the annexed diagrams), such as are introduced in engineering to give stiffness to beams, have the reverse of a good effect when torsional rigidity or strength is an object, although they are truly of great value in increasing the flexural rigidity, and giving strength to bear ordinary strains, which are always more or less flexural.

With remarkable ingenuity and mathematical skill he has drawn beautiful illustrations of this important practical principle from his algebraic and transcendental solutions.

Thus, for an equilateral triangle, and for the rectilinear and three curvilinear squares shown in the diagrams (fig. 12), he finds for the torsional rigidities the values stated. The number immediately below the diagram indicates in each case the fraction which the true torsional rigidity is of the old fallacious estimate (section 65)—the latter being the product of the rigidity of the substance into the moment of inertia of the cross section round an axis perpendicular to its plane through its centre of inertia. The second number indicates in each case the fraction which, the torsional rigidity is of that of a solid circular cylinder of the same sectional area.

71. Places of greatest Distortion in Twisted Prisms.—M. de St Venant also calls attention to a conclusion from his solutions which to many may be startling, that in his simpler cases the places of greatest distortion are those points of the boundary which are nearest to the axis of the twisted prism in each case, and the places of least distortion those farthest from it. Thus in the elliptic cylinder the
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substance is most strained at the ends of the smaller principal diameter, and least at the ends of the greater. In the equilateral triangular and square prisms there are two lines of maximum strain through the middle of the sides. In the oblong rectangular prism there are two lines of greater maximum strain through the middle of the broader pair of sides, and two lines of less maximum strain through the middle of the narrower sides. The strain is, as we may judge from the hydrokinetic analogy, excessively small, but not evanescent, in the projecting ribs of a prism of the figure shown in (2) of section 69. It is quite evanescent infinitely near the angle, in the triangular and rectangular prisms, and in each other case, as (3) of section 69, in which there is a finite angle, whether acute or obtuse, projecting part of the edge; and generally bounded by any surfaces presenting acute or obtuse, cannot experience any finite stress or strain.

The solution shows that when the solid is continuous from the circular cylindrical surface to its axis, as in (4), (5), (6), the strain is zero or infinite according as the angle between the bounding planes of the solid is less than or greater than two right angles as in cases (4) and (6) respectively.

73. Changes of Temperature produced by Compressions or Dilatations of a Fluid and Stresses of any kind in an Elastic Solid.—From thermodynamic theory it is concluded that cold is produced whenever a solid is strained by opposing, and heat when it is strained by yielding to, any elastic force of its own, the strength of which would diminish if the temperature were raised; but that, on the contrary, heat is produced when a solid is strained against, and cold when it is strained by yielding to, any elastic force of its own, the strength of which would increase if the temperature were raised. When the strain is a condensation or dilatation, uniform in all directions, a fluid may be included in the statement. Hence the following propositions:

(1.) A cubic compression of any elastic fluid or solid in an ordinary condition causes an evolution of heat, but, on the contrary, a cubic compression produces cold in any substance, solid or fluid, in such an abnormal state that it would contract if heated while kept under constant pressure. Water below its temperature (3°9 Cent.) of maximum density is a familiar instance. (See table of section 76.)

(2.) If a wire already twisted be suddenly twisted further, always, however, within its limits of elasticity, cold will be produced; and if it be allowed suddenly to untwist, heat will be evolved from itself (besides heat generated externally by any work allowed to be wasted, which it does in untwisting). It is assumed that the torsional rigidity of the wire is diminished by an elevation of temperature, as the writer of this article had found it to be for copper, iron, platinum, and other metals (compare section 78).

(3.) A spiral spring suddenly drawn out will become lower in temperature, and will rise in temperature when suddenly allowed to draw in. (This result has been experimentally verified by Joule ("Thermodynamic Properties of Solids," Trans. Roy. Soc., 1858) and the amount of the effect found to agree with that calculated, according to the preceding thermodynamic theory, from the amount of the weakening of the spring which he found by experiment.)

(4.) A bar or rod or wire of any substance with or without a weight hung on it, or experiencing any degree of end thrust, to begin with, becomes cooled if suddenly elongated by end pull or by diminution of end thrust, and warmed if suddenly shortened by end thrust or by diminution of end pull, except abnormal cases in which with constant end pull or end thrust elevation of temperature produces shortening; in every such case pull or diminished thrust produces elevation of temperature, thrust or diminished pull lowering of temperature.

(5.) An india-rubber band suddenly drawn out (within its limits of elasticity) becomes warmer; and when allowed to contract, it becomes colder. Any one may easily verify this curious property by placing an india-rubber band in slight contact with the edge of the lips, then suddenly extending it—it becomes very perceptibly warmer: hold it for some time stretched nearly to breaking, and then suddenly allow it to shrink—it becomes quite startlingly colder, the cooling effect being sensible not merely to the lips but to the fingers holding the band. The first published statement of this curious observation is due to Gough (Memorials of the Literary and Philosophical Society of Manchester, 2d series, vol. i. p. 288), quoted by Joule in his paper on "Thermodynamic Properties of Solids" (Transactions of Royal Soc., 1858). The thermodynamic conclusion from it is that an india-rubber band, stretched by a constant weight of sufficient amount hung on it, must, when heated, pull up the weight, and, when cooled, allow the weight to descend; this Gough, independently of thermodynamic theory, had found to be actually the case. The experiment any one can make with the greatest ease is by hanging a few pounds weight on a common india-rubber band, and taking a red-hot coal in a pair of tongs, or a red-hot poker, and moving it up and down close to the band. The way in which the weight rises when the red-hot body is near, and falls when it is removed, is quite startling. Joule experimented on the amount of shrinking per degree of elevation of temperature, with different weights hung on a band of vulcanized india-rubber, and found that they closely agreed with the amounts calculated by Thomson's theory from the heating effects of pull, and cooling effects of ceasing to pull, which he had observed in the same piece of india-rubber.
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74. The thermodynamic theory gives one formula by which the change of temperature in every such case may be calculated when the other physical properties are known:—

\[ \theta = \frac{t}{F P} ; \]

where \( \theta \) denotes the elevation of temperature produced by the sudden application of a stress \( P \);

\( t \), the temperature of the substance on the absolute thermodynamic scale, the change of temperature \( \theta \) being supposed to be but a very small fraction of \( t \);

\( e \), the geometrical effect (expansion or other strain) produced by an elevation of temperature of one degree when the body is kept under constant stress;

\( K \), the specific heat of the substance per unit mass under constant stress;

\( p \), the density;

and \( J \), Joule's equivalent (taken as 42400 centimetres).

In using the formula for a fluid, \( p \) must be normal pressure equal in all directions, or normal pressure on a set of parallel planes, or tangential traction on one or other of the two sets of mutually perpendicular parallel planes which (section 43) experience tangential traction when the body is subjected to a simple distorting stress; or, quite generally, \( p \) may be the proper numerical reckoning (Mathematical Theory, chap. x.) of any stress, simple or compound. When \( p \) is pressure uniform in all directions, \( e \) must be expansion of bulk, whether the body expands equally in all directions or not. When \( p \) is tangential to a set of parallel planes, \( e \) must be expansion in the direction opposed to this pressure, irrespective of any change of shape not altering the distance between the two planes of the solid perpendicular to the direction of \( p \). When \( p \) is a simple tangential stress, reckoned \( \pm \) as in section 43, \( e \) must be the change, reckoned in fraction of the radius, of the angle, infinitely nearly a right angle, between the two sets of parallel planes in either of which there is the tangential traction denoted by \( p \). In each of these cases \( p \) is reckoned simply in units of force per unit of area. Quite generally \( p \) may be any stress, simple or compound, and \( e \) must be the component (Math. Th., chap. viii. and ix.) to the type of \( p \), of the strain produced by an elevation of temperature of one degree when the body is kept under constant stress. The constant stress for which \( K \) and \( e \) are reckoned ought to be the mean of the stresses which the body experiences with and without \( p \). Mathematically speaking, \( p \) is to be infinitesimal, but practically it may be of any magnitude moderate enough not to give any sensible difference in the value of either \( K \) or \( e \), whether the "constant stress" be with \( p \) or without \( p \), or with the mean of the two: thus for air \( p \) must be a small fraction of the whole pressure, for instance a small fraction of one atmosphere for air at ordinary pressure, for water or watery solutions of salts or other solids, for mercury, for oil, and for other known liquids \( p \) may, for all we know, amount to twenty atmospheres or one hundred atmospheres without transgressing the limits for which the preceding formula is applicable. When the law of variation of \( K \) and \( e \) with pressure is known, the differential formula is readily integrated to give the integral amount of the change of temperature produced by greater stress than those for which the differential formula is applicable. For air and other permanent gases Boyle's law of compression and Charles's law of thermal expansion supply the requisite data with considerable accuracy up to twenty or thirty atmospheres. The result is expressed by the formula:

\[ \frac{t + \theta}{t} = \left( \frac{P + P_{0}}{P} \right)^{1/\gamma} \]

where \( k \) denotes the ratio of the thermal capacity, pressure constant, to the thermal capacity, volume constant, of the gas, a number which thermodynamic theory proves to be approximately constant for all temperatures and densities, for any fluid approximately fulfilling Boyle's and Charles's laws;

\( P \) and \( t \) the initial pressure and temperature of the gas;

\( P_{0} \) the sudden addition to the pressure;

and, as before, \( \theta \) the elevation of temperature.

For the case of \( p \) a small fraction of \( P \) the formula gives:

\[ \theta = (k - 1) \frac{P}{t} \]

It is by an integration of this formula that (1) is obtained.

For common air the value of \( k \) is very approximately 1.41. Thus if a quantity of air be given at 15° C. (\( t = 289^\circ \)) and the ordinary atmospheric pressure, and if it be compressed gradually up to 23 atmospheres, or diluted to \( \gamma \) of an atmosphere, and perfectly guarded against gain or loss of heat from or to without, its temperature at several different pressures, chosen for example, will be according to the following table of excesses of temperature above the primitive temperature, calculated by (1).

### TABLE SHOWING EFFECTS OF PRESSURE ON TEMPERATURE.

<table>
<thead>
<tr>
<th>Value of ( P/P_{0} )</th>
<th>Elevation of temperature produced by compression</th>
<th>Value of ( k-P )</th>
<th>Lowering of temperature produced by dilatation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>95°</td>
<td>1</td>
<td>217°</td>
</tr>
<tr>
<td>4</td>
<td>221</td>
<td>2</td>
<td>125°</td>
</tr>
<tr>
<td>8</td>
<td>269</td>
<td>4</td>
<td>22°</td>
</tr>
<tr>
<td>16</td>
<td>612</td>
<td>8</td>
<td>45°</td>
</tr>
<tr>
<td>32</td>
<td>911</td>
<td>16</td>
<td>219°</td>
</tr>
</tbody>
</table>

But we have no knowledge of the effect of pressures of several thousand atmospheres in altering the expansibility or specific heat in liquids, or in fluids which at less heavy or at ordinary pressures are "gases."

75. When change of temperature, whether in a solid or a fluid is produced by the application of a stress, the corresponding modulus of elasticity will be greater in virtue of the change of the temperature than what may be called the static modulus defined as above, on the understanding that the temperature if changed by the stress is brought back to the primitive temperature, calculated by (1).


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\[ p = \frac{e}{L} \]

Dividing \( p \) by this expression we find for the kinetic modulus

\[ M' = \frac{1}{\frac{e}{L}} \]

Hence

\[ M' = \frac{1}{e} \]

76. For any substance, fluid or solid, it is easily proved, without thermodynamic theory, that

\[ M' = \frac{K}{N} \]

where \( K \) denotes the thermal capacity of a stated quantity of the substance under constant stress, and \( N \) its thermal capacity under constant strain (or thermal capacity when the body is prevented from change of shape or change of volume). For permanent gases, and generally for fluids approximately fulfilling Boyle’s and Charles’s laws as above, \( K \) is proved by thermodynamic theory to be approximately constant. Its value for all gases for which it has been measured differs largely from unity, and probably also for liquids generally (except water near its temperature of maximal density).

On the other hand, for solids whether the stress considered be uniform compression in all directions or of any other type, the value of \( M' \) or \( K \) differs but very little from unity; and both for solids and liquids it is far from constant at different temperatures (in the case of water it is zero at \( 3^\circ \) Cent., and varies as the square of the difference of the temperature from \( 3^\circ \) at all events for moderate differences from this critical temperature, whether above or below it). The following tables show the value of \( M' \) or \( K \), and the value of \( \theta \) by the formula of sec. 74, for different fluid and solid substances at the temperature 15° Cent. (289° absolute scale). The first table is for compression uniform in all directions, the second, necessarily confined to solids, is for the stress dealt with in “Young’s Modulus,” that is, normal pressure (positive or negative) on one set of parallel planes, with perfect freedom to expand or contract in all directions in these planes. A wire or rod pulled longitudinally is a practical application of the latter

**THERMODYNAMIC TABLE I.**

Pressure equal in all directions—Ratio of Kinetic to Static Bulk Modulus. Temperature 15° C. (289° absolute) \( = 42400 \) centistresses.

<table>
<thead>
<tr>
<th>Substance</th>
<th>Density</th>
<th>Thermal Capacity per unit mass ( = K )</th>
<th>Expansion ( = \theta )</th>
<th>Elevation of Temperature produced by a pressure of one gramme per square centimetre ( = \theta / K )</th>
<th>Static Bulk Modulus in grammes per square centimetre ( = M' )</th>
<th>Deduced value of ( M' = \frac{K}{N} ) ( = \frac{1}{\theta / K} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air</td>
<td>0.00255</td>
<td>0.00005</td>
<td>0.00000004</td>
<td>0.000011</td>
<td>22.53 x 10^8</td>
<td>1032</td>
</tr>
<tr>
<td>Distilled water</td>
<td>1.000</td>
<td>1.000</td>
<td>0.000012</td>
<td>0.000001</td>
<td>22.53 x 10^8</td>
<td>1032</td>
</tr>
<tr>
<td>Alcohol</td>
<td>0.792</td>
<td>0.0148</td>
<td>0.000012</td>
<td>0.000001</td>
<td>22.53 x 10^8</td>
<td>1032</td>
</tr>
<tr>
<td>Ether</td>
<td>0.706</td>
<td>0.0117</td>
<td>0.000015</td>
<td>0.000002</td>
<td>22.53 x 10^8</td>
<td>1032</td>
</tr>
<tr>
<td>Mercury</td>
<td>12.36</td>
<td>0.0070</td>
<td>0.000010</td>
<td>0.000001</td>
<td>22.53 x 10^8</td>
<td>1032</td>
</tr>
<tr>
<td>Glass, fused</td>
<td>2.949</td>
<td>0.0017</td>
<td>0.000002</td>
<td>0.000001</td>
<td>22.53 x 10^8</td>
<td>1032</td>
</tr>
<tr>
<td>Iron</td>
<td>7.977</td>
<td>0.0098</td>
<td>0.000006</td>
<td>0.000001</td>
<td>22.53 x 10^8</td>
<td>1032</td>
</tr>
<tr>
<td>Copper</td>
<td>8.948</td>
<td>0.0098</td>
<td>0.000006</td>
<td>0.000001</td>
<td>22.53 x 10^8</td>
<td>1032</td>
</tr>
</tbody>
</table>

77. Experimental Results.—The following tables show determinations of moduluses of compression, of Young’s modulus, and of moduluses of rigidity by various experimenters and various methods. It will be seen that the Young’s moduluses obtained by Wertheim by vibrations, longitudinal or transverse, are generally in excess of those which he found by statics, but the differences are enormously greater than those due to the heating and cooling effects of elongation and contraction (section 76), and are to be certainly reckoned as errors of observation. It is probable that his moduluses determined by static elongation are minutely accurate, the discrepancies found by vibrations are probably due to imperfections of the arrangements for carrying out the vibrational method:

**TABLE OF MODULUSES OF COMPRESSION.**

<table>
<thead>
<tr>
<th>Substance</th>
<th>Moduluses of compressibility in grammes per square centimetre</th>
<th>Temperature</th>
<th>Authority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distilled water</td>
<td>22.5 x 10^8</td>
<td>15°</td>
<td>Amaury and Descamps, Comptes Rendus, tome xvi. p. 164 (1889)</td>
</tr>
<tr>
<td>Alcohol</td>
<td>12.5 x 10^8</td>
<td>9°</td>
<td>Everett’s Illustrations of the Centimetre-Gramme-Second System of Units, 1843</td>
</tr>
<tr>
<td>Ether</td>
<td>9.5 x 10^8</td>
<td>9°</td>
<td>Everett’s Illustrations of the Centimetre-Gramme-Second System of Units, 1843</td>
</tr>
<tr>
<td>Biurethide of carbon</td>
<td>8.07 x 10^8</td>
<td>14°</td>
<td>Everett’s Illustrations of the Centimetre-Gramme-Second System of Units, 1843</td>
</tr>
<tr>
<td>Mercury</td>
<td>552.5 x 10^8</td>
<td>14°</td>
<td>Everett’s Illustrations of the Centimetre-Gramme-Second System of Units, 1843</td>
</tr>
<tr>
<td>Glass</td>
<td>425 x 10^8</td>
<td>14°</td>
<td>Everett’s Illustrations of the Centimetre-Gramme-Second System of Units, 1843</td>
</tr>
<tr>
<td>Another specimen</td>
<td>354 x 10^8</td>
<td>14°</td>
<td>Everett’s Illustrations of the Centimetre-Gramme-Second System of Units, 1843</td>
</tr>
<tr>
<td>Steel</td>
<td>1876 x 10^8</td>
<td>14°</td>
<td>Everett’s Illustrations of the Centimetre-Gramme-Second System of Units, 1843</td>
</tr>
<tr>
<td>Iron</td>
<td>1850 x 10^8</td>
<td>14°</td>
<td>Everett’s Illustrations of the Centimetre-Gramme-Second System of Units, 1843</td>
</tr>
<tr>
<td>Copper</td>
<td>1717 x 10^8</td>
<td>14°</td>
<td>Everett’s Illustrations of the Centimetre-Gramme-Second System of Units, 1843</td>
</tr>
<tr>
<td>Brass, different specimen</td>
<td>Mean</td>
<td>1063 x 10^8</td>
<td></td>
</tr>
</tbody>
</table>

**TABLE OF MODULUSES OF RIGIDITY.**

<table>
<thead>
<tr>
<th>Substance</th>
<th>Moduluses of rigidity in grammes per square centimetre</th>
<th>Authority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glass, different specimen</td>
<td>Mean 150 x 10^8</td>
<td>Wertheim, Annales de Chemie, 1848</td>
</tr>
<tr>
<td>Brass, different specimen</td>
<td>Mean 250 x 10^8</td>
<td>Wertheim, Annales de Chemie, 1848</td>
</tr>
<tr>
<td>Glass</td>
<td>243 x 10^8</td>
<td>Everett’s Ill. of the Centimetre-Gramme-Second System of Units, 1843</td>
</tr>
<tr>
<td>Another specimen</td>
<td>543 x 10^8</td>
<td>Everett’s Ill. of the Centimetre-Gramme-Second System of Units, 1843</td>
</tr>
<tr>
<td>Brass, drawn</td>
<td>373 x 10^8</td>
<td>Everett’s Ill. of the Centimetre-Gramme-Second System of Units, 1843</td>
</tr>
<tr>
<td>Steel</td>
<td>834 x 10^8</td>
<td>Everett’s Ill. of the Centimetre-Gramme-Second System of Units, 1843</td>
</tr>
<tr>
<td>Iron, wrought</td>
<td>785 x 10^8</td>
<td>Everett’s Ill. of the Centimetre-Gramme-Second System of Units, 1843</td>
</tr>
<tr>
<td>Copper</td>
<td>465 x 10^8</td>
<td>Everett’s Ill. of the Centimetre-Gramme-Second System of Units, 1843</td>
</tr>
<tr>
<td>Material</td>
<td>Density</td>
<td>Elasticity</td>
</tr>
<tr>
<td>-------------------</td>
<td>---------</td>
<td>------------</td>
</tr>
<tr>
<td>Steel, wrought</td>
<td>0.125</td>
<td>20000000</td>
</tr>
<tr>
<td>Copper, wrought</td>
<td>0.110</td>
<td>25000000</td>
</tr>
<tr>
<td>Zinc, wrought</td>
<td>0.105</td>
<td>30000000</td>
</tr>
</tbody>
</table>

*Values in grammea per centimetre, and in terms of 10000000 ft.*
78. A question of great importance in the physical theory of the elasticity of solids, "What changes are produced in the modulus of elasticity by permanent changes in its molecular condition," has occupied the attention, no doubt, of every "naturalist" who has studied the subject, and valuable contributions to its answer by experiment had been given by Wertheim and other investigators, but solely with reference to Young's modulus. In 1865 an investigation of the effect of the torsional rigidity of wires of different metals, produced by stretching them longitudinally beyond their limits of elasticity, was commenced in the physical laboratory of the university of Glasgow in its old buildings in 1865. The following description of experiments is extracted from the paper by W. Thomson "On the Elasticity and Viscoelasticity of Metals," already quoted (section 30), with reference to viscosity and fatigue of elasticity.

"To determine rigidity by torsional vibrations, taking advantage of an obvious but most valuable suggestion made to me by Dr Joule, I used as vibrator in each case a thin cylinder of brass, of 1 inch in diameter. The cylinder was placed in a crucible filled with water and distilled. The water was repeatedly raised to a boil and allowed to cool slowly, so that it could carefully be touched without breaking it, and which had been found to be reduced in density by this process to as low as 0.767. The 1865 experiments, therefore, are all commercial specimens—those of copper being all, or nearly all, cut from bars supplied by the Giffard, Latour, and Son Company, having been selected as of high electrical conductivity, and of good mechanical quality, for submarine cables.

It ought to be remarked that the change of molecular condition produced by permanently stretching a wire or solid cylinder of metal is a certain change from a condition which, if originally isotropic, becomes anisotropic as to some qualities, and that the changed conditions may be presumed to be so anisotropic as to elasticity. If so, the rigidity corresponding to the direct and diagonal directions (indicated by No. 1 and No. 2 in fig. 14) must in all probability become different from one another when a wire is permanently stretched, instead of being equal as they must be when the substance is isotropic. It becomes, therefore, a question of extreme interest to find whether rigidity No. 2 is not increased by this process, which, as is shown by the experiments above described, diminishes, to a very remarkable degree, the rigidity No. 1. The most obvious experiment, and indeed the only practicable experiment, adapted to answer this question, for a wire or round bar is that of Cagniard-Lattre, in which an accurate determination of the difference produced in the volume of the substance as made by applying and removing longitudinal traction within its limits of elasticity. With the requisite apparatus, which must be much more accurate than that of Cagniard-Lattre, a most important and interesting investigation might be made. The results, along with an accurate determination of the Young's modulus for the particular case, give (sec 47) the modulus of compression, and the rigidity

<table>
<thead>
<tr>
<th>Substance</th>
<th>Length of Wire</th>
<th>Volume in cubic centimeters</th>
<th>Moment of Inertia of Vibrator No.</th>
<th>Time of Vibration in grams weight per square centimeter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminium</td>
<td>10.0</td>
<td>1300</td>
<td>0.767</td>
<td>0.005</td>
</tr>
<tr>
<td>Zinc</td>
<td>0.40</td>
<td>0.351</td>
<td>0.767</td>
<td>0.005</td>
</tr>
<tr>
<td>Brass</td>
<td>250</td>
<td>15.0</td>
<td>0.767</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>214</td>
<td>1.0</td>
<td>0.767</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>147</td>
<td>9.0</td>
<td>0.767</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>268</td>
<td>8.0</td>
<td>0.767</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>201</td>
<td>8.0</td>
<td>0.767</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>374</td>
<td>1.0</td>
<td>0.767</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>251</td>
<td>8.0</td>
<td>0.767</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>250</td>
<td>15.0</td>
<td>0.767</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>270</td>
<td>0.767</td>
<td>0.005</td>
<td>0.03</td>
</tr>
<tr>
<td>Copper</td>
<td>259</td>
<td>8.0</td>
<td>0.767</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>297</td>
<td>0.767</td>
<td>0.005</td>
<td>0.01</td>
</tr>
<tr>
<td>Copper</td>
<td>256</td>
<td>0.767</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>267</td>
<td>0.767</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>280</td>
<td>0.767</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>292</td>
<td>0.767</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>309</td>
<td>0.767</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>315</td>
<td>0.767</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>255</td>
<td>0.767</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>251</td>
<td>8.0</td>
<td>0.767</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>252</td>
<td>15.0</td>
<td>0.767</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>262</td>
<td>0.767</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>270</td>
<td>0.767</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>278</td>
<td>0.767</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>287</td>
<td>0.767</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>297</td>
<td>0.767</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>308</td>
<td>0.767</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>256</td>
<td>0.767</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>267</td>
<td>0.767</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>280</td>
<td>0.767</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>292</td>
<td>0.767</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>309</td>
<td>0.767</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>315</td>
<td>0.767</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>255</td>
<td>0.767</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>251</td>
<td>8.0</td>
<td>0.767</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>252</td>
<td>15.0</td>
<td>0.767</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>262</td>
<td>0.767</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>270</td>
<td>0.767</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>278</td>
<td>0.767</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>287</td>
<td>0.767</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>297</td>
<td>0.767</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>308</td>
<td>0.767</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>256</td>
<td>0.767</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>267</td>
<td>0.767</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>280</td>
<td>0.767</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>292</td>
<td>0.767</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>309</td>
<td>0.767</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>Copper</td>
<td>315</td>
<td>0.767</td>
<td>0.005</td>
<td>0.005</td>
</tr>
</tbody>
</table>

Remarks.
1. Only forty vibrations from initial arc of convenient amplitudes could be counted. Had been stretched considerably before this experiment.
2. So minute that only twenty vibrations could be counted.
3. In the preceding stretch.
4. A piece of the preceding stretched.
5. The preceding made red-hot in a crucible filled with powdered charcoal and allowed to cool slowly, became very brittle a part of it with difficulty saved for the experiment.
6. Another piece of the long (2450 centim.) wire; stretched by successive simple tractions.
7. A new gauge copper wire, stretched with successive tractions.
8. A fine gauge copper wire, suffered by being heated to redness and plunged in water. A length of 250 centimeters cut from this, suspended, and elongated by successive simple tractions.
9. Another length of 250 centimeters cut from the same, and similarly treated.
10. One piece, successively elongated by simple tractions till it broke.


79. The following tables show the effects of different temperatures on the Young’s Modulus, rigidity-modulus, and modulus of compressibility of various substances:

<table>
<thead>
<tr>
<th>Substance</th>
<th>Denot.</th>
<th>Young’s Modulus in millions per square centimetre at 12°, 10°, 20°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead</td>
<td>11 223</td>
<td>173.0, 153.0, 143.0</td>
</tr>
<tr>
<td>Gold</td>
<td>18 085</td>
<td>558.0, 531.0, 518.0</td>
</tr>
<tr>
<td>Silver</td>
<td>19 094</td>
<td>715.0, 717.0, 637.0</td>
</tr>
<tr>
<td>Palladium</td>
<td>11 225</td>
<td>379.0, 379.0, 379.0</td>
</tr>
<tr>
<td>Copper</td>
<td>8 926</td>
<td>1052.0, 983.0, 726.0</td>
</tr>
<tr>
<td>Platinum</td>
<td>21 088</td>
<td>1552.0, 1418.0, 1324.0</td>
</tr>
<tr>
<td>Steel, drawn, English</td>
<td>7 622</td>
<td>1728.0, 2199.0, 1924.0</td>
</tr>
<tr>
<td>Cast steel</td>
<td>7 919</td>
<td>1956.0, 1901.0, 1792.0</td>
</tr>
<tr>
<td>Iron, Bury</td>
<td>7 727</td>
<td>2079.0, 2139.0, 1770.0</td>
</tr>
</tbody>
</table>

The above results are from Wertheim’s “Mémoires” on Elasticity, Ann. de Chem. et Phys., tom xii. (1844).

The change in the rigidity-modulus produced by change of temperature was investigated by Kohlschütz. He found that it is expressed by the formula \( a = n \alpha - \beta c \), where \( n \) denotes the value of the rigidity-modulus at \( 0 \)° C, \( \alpha \), \( \beta \), coefficients the values of which for iron, copper, and brass are as follows:

<table>
<thead>
<tr>
<th>Substance</th>
<th>( \alpha )</th>
<th>( \beta )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron</td>
<td>0.000447</td>
<td>0.0000023</td>
</tr>
<tr>
<td>Copper</td>
<td>0.000420</td>
<td>0.0000023</td>
</tr>
<tr>
<td>Brass</td>
<td>0.000423</td>
<td>0.0000023</td>
</tr>
</tbody>
</table>

Table: Modulus of Compressibility of Water, Alcohol, and Ether at Different Temperatures

<table>
<thead>
<tr>
<th>Temp. Grad.</th>
<th>Modulus of compressibility in grammes per square centimetre at 12°, 10°, 20°</th>
</tr>
</thead>
<tbody>
<tr>
<td>0°</td>
<td>Water: 20 6 x 10^6, 12 4 x 10^6, 9 5 x 10^6; Alcohol: 22 4 x 10^6; Ether: 24 2 x 10^6</td>
</tr>
<tr>
<td>20°</td>
<td>Amaury and Descamps, Comptes Rendus, tome xiii. (1854).</td>
</tr>
</tbody>
</table>

80. Tempering soft iron by long-continued stress.

Preliminary experiments by Mr J. T. Bottomley towards the investigation promised in section 5 above have discovered a very remarkable property of soft iron wire respecting its ultimate tensile strength. Eight different specimens, tested by the gradual application of more and more weight within ten minutes of time in each case until the wire broke, bore from 45 1/2 to 46 1/2 lb (average 45 1/2) just before breaking, with elongations of from 17 per cent to 25 per cent. Another specimen left with 43 lb hanging on it for 24 hours, and then tested by the gradual addition of weights during 25 minutes till it broke, bore 49 1/2 lb before breaking, with elongation of 15 per cent. Another left for 3 days 11 hours 40 minutes with 43 lb hanging on it, and then tested by the gradual addition of weights during 31 minutes till it broke, bore 51 1/2 lb just before breaking, with elongation of 14 1/4 per cent. Another specimen of the same wire was set up with 40 lb hanging on it on the 5th of July 1867, on the 6th of July 3 lb were added, on the 9th 4 lb more, and on the 10th 3 lb more, making in all on this date 45 lb. Thereupon continued day by day, with occasional intervals of two days or three days, the weight was increased first by half a pound at a time, and latterly by a quarter of a pound at a time, until on the 3d of September the wire broke with 57 1/2 lb (elongation not recorded). This gradual addition of weight therefore had increased the tensile strength of the metal by 20 7/8 per cent.

81. Experiments made for this article.—There are many subjects in the theory of elasticity regarding which information to be obtained by experiment only is greatly wanted. Several of these have been pointed out above (section 21), and while this article was being put in type, experiments were made in the university of Glasgow with a view of answering some of the questions proposed. Mr Donald Macfarlane, besides making the experiments referred to in sections 3 and 21, investigated the effects of applying different amounts of pull to a steel pianoforte wire which had been twisted to nearly its limits of elasticity, and which was kept twisted by means of a couple. The results proved a deviation from Hooke’s law by showing a diminution of the torsional rigidity, of about 1.6 per cent., produced by hangmg a weight of 112 lb on the wire. Of this 1.2 per cent. is accounted for by elongation and by shrinkage of the diameter, leaving 4 per cent. of diminution of the rigidity-modulus.

It was also found that when the wire was twisted far beyond its limits of elasticity, and then freed from torsional stress, a weight hung on it caused it to untwist slightly. When the weight was removed and reapplied again and again, the lower end of the wire always turned in the same direction as the permanent twist when the weight was removed, and in the opposite direction when it was applied. This result shows the development of molotropism in the substance of the wire, according to which a small cube cut from any part of it far out from the axis, with two sides of the cube parallel to the length, and the other two pairs of sides making angles of 45° with the length, would show different compressibilities in the directions perpendicular to the last-mentioned pairs of sides.

Another very interesting result, discovered in the course of these experiments, was that when a length of five metres of the steel wire, with a weight of 39 lb hung upon it, was twisted to the extent of 95 turns, it became gradually elongated to the extent of \( \frac{1}{2} \) of the length of the wire; when further twisted it began to shorten till, when 25 turns had been given (in all 120 turns), the weight had risen from its lowest position through nearly \( \frac{1}{8} \) of the length of the wire, so that the previous elongation had been diminished by about \( \frac{1}{4} \) of its amount.

Experiments were also made by Mr Andrew Gray and Mr Thomas Gray for the purpose of determining the effects of various amounts of permanent twist in altering the rigidity-modulus and the Young’s modulus of wires of copper, iron, and steel. A copper wire, of 3.15 metres in length and 154 centimetre diameter, No. 17 B.W.G., which had a rigidity-modulus of 442 million grammes per square centimetre to begin with, was found to have 420 after 10 turns, showing a diminution in the modulus of \( \frac{1}{4} \) of its original value. There was little further change until 150 turns had been given, when the modulus began to increase. At 1525 turns its value was 373, and at 1625 it was 377. Twenty turns more broke the wire before the torsional elasticity had been again determined.

A piece of iron wire of nearly the same length, about three metres, but of smaller diameter (087 centimetre), showed continued diminution of torsional rigidity as far as
1350 turns of permanent twist, when the diminution had amounted to 14 per cent. of the primitive value, 36 turns more broke the wire, and another determination of torsional rigidity had been made.

The steel pianoforte wire also showed a diminution of torsional rigidity with permanent twist, and (as did the copper wire) showed first a diminution and then a slight augmentation of the amount which had been discovered in the copper wire, and the ultimate augmentation was considerably greater in the steel than what it had been in the copper before rupture. Thus after 473 turns of permanent twist the torsional modulus had diminished from 751 million grammes per square centimetre to 414 1 95 more turns of permanent twist augmented the rigidity from 414 to 430, and when further twisted the wire broke before another observation had been made. The vibrator used in these experiments was a cylinder of lead weighing 56 lb., which was kept hanging on the wire while it was being twisted, and in fact during the whole of about 100 hours from the beginning of the experiment till the wire broke, except on two occasions for a few minutes, while the top fastening which had given way was being replaced. The period of vibration was augmented from 39-375 seconds to 51-9 seconds by the twist. The wire took the twist very irregularly, some parts not beginning to show much signs of permanent twist till near the end of the experiment.

In two specimens of copper wire of the same length and gauge, one of which was drawn about the Young's modulus was found to be increased 10 per cent by 100 turns of permanent twist.

Five metres of the steel pianoforte wire, bearing a weight of 39 lb., was in one of Mr. McFarlane's experiments twisted 1290 turns, and then allowed to untwist, and 384 turns came out, leaving the wire in equilibrium with 81 2 turns of permanent twist. Its Young's modulus was then found not to differ as much as 1/2 per cent, from the value it had before the wire was twisted.

MATHEMATICAL THEORY OF ELASTICITY.

PART I—On Stressess and Stresses 2

I. Definitions and Explanations

Def. An stress is an equilibrating application of force to a body.

Cor. The stress on any part of a body in equilibrium will thus signify the force which it experiences from the matter touching that part and that matter, whether elastic or inelastic with itself, or only across a portion of its bounding surface.

Def. A strain is any definite alteration of form or dimensions experienced by a solid.

Examples.—Equal and opposite forces acting at the two ends of a wire or rod of any substance will elongate a string upon it. A body pressed equally all round—for instance, any mass touched by air on all sides—will experience a stress. A stone in a load will experience a stress if it is pressed upon by another stone, or by any parts of the structure, in contact with it. Any part of a continuous solid must simply set up on a solid base, experience stress from the surrounding parts in consequence of its weight. The different parts of a ship in a heavy sea experience stresses from both which they are except when the water is smooth.

If a rod of any substance becomes either longer or shorter, it is said to experience a strain. If a stone, a beam, or any mass of metal in a building, or in a piece of furniture, be of large dimensions or inclined, or twisted, or distorted in any way, it is said to experience a strain, to become strained, or often in common language simply "to strain." A ship may be said to "strain" if it is heeling, or when working in a heavy sea, the different parts of it experience relative motions.

CHAPTER II—Homogeneous Stressess and Homogeneous Strains

Def. A stress as equal and simultaneous through a body when equal and similar portions of the body, with corresponding lines parallel, experience equal and parallel forces or tensions on corresponding elements of their surfaces.

Cor. When a body is subjected to any homogeneous stress, the mutual tension or pressure between the parts of it on two sides of any plane amounts to the same per unit of surface as that between the parts on the two sides of any parallel plane, and the former tension or pressure is parallel to the latter.

A strain is said to be homogeneous throughout a body, or the body is said to be homogeneously strained, when equal and similar portions, with corresponding lines parallel, experience equal and similar alterations of dimensions.

Cor. All the particles of the body in parallel planes remain in parallel planes, when the body is homogeneously strained in any way.

Examples.—A long uniform rod, if pulled out, or a pillar loaded with a weight, will experience a uniform stress, even at its ends. There will be a sensible resistance to the attempt of flattening the ends of the pillar, or of causing the two top plates of a cylindrical vessel to press against each other in consequence of the ends being extended in the same extent as the middle does.

A piece of steel held in a plane and distorted so that a webby and wool instead of being perpendicular to this, is, by some two planes parallel cutting one another obliquely, experiences a homogeneous strain. The strain is homogeneous as it respects to the area of the web in the same extent as the middle does.

CHAPTER III—On the Equilibrium of Forces in a Strain

Theorem.—In every homogeneous stress there is a system of three rectangular planes, each of which is perpendicular to the direction of the mutual force between the parts of the body on its two sides.

For let P(X), P(Y), P(Z) denote the components, parallel to X, Y, Z, any three rectangular lines of reference of the force experienced per unit of surface at any portion of the solid bounded by a plane parallel to (Y, Z), Q(X), Q(Y), Q(Z), the corresponding components of the force experienced by any surface of the solid parallel to (Z, X), and R(X), R(Y), R(Z), those of the force at a surface parallel to (X, Y).

Now, by considering the equilibrium of a cube of the solid with faces parallel to the planes of reference (fig 15), we see that the couple of forces Q(Z) on its two faces perpendicular to Y is balanced by the couple of forces R(Y) on the faces perpendicular to Z. Hence we must have

\[ Q(Z) = R(Y) \]

Similarly, it is seen that

\[ R(X) = P(Z) \]

and

\[ P(Y) = Q(X) \]

For the case of brevity, these pairs of equal quantities (being tangential forces respectively perpendicular to X, Y, Z) may be denoted by T(X), T(Y), T(Z).

Consider a tetrahedral portion of the body surrounded it may with continuous solid) contained within three planes A, B, C, through a point O parallel to the planes of lines of reference, and a third plane K cutting these at angles a, b, c respectively, so that as regards the areas of the different sides we shall have

\[ A = \cos a + \cos b \cos c + \cos \gamma \cos \theta \]

The forces actually experienced by the sides A, B, C have nothing to balance them except the force actually experienced by K. Hence those three forces must have a single resultant, and the force on K must be equal and opposite to it. If, therefore, the force on K per unit of surface is denoted by F, and its direction comes by i, m, n, we have

\[ F \sin i = T(X) \sin m = T(Z) \sin n \]

and, by the relations between the cases stated above, we deduce

\[ F = T(X) \sin m = T(Z) \sin n \]

Hence the problem of finding (a, b, g), so that the force F (i, m, n) may be perpendicular to it can be solved by substituting cos a, cos b, cos c, cos \( \gamma \) for i, m, n in those equations. By the elimination of cos a, cos b, cos \( \gamma \) from the three equations thus obtained, we have the well-known cubic determinant equation, of which the roots necessarily real, lead, when two of them are equal, to one and only one system of three rectangular axes having the stated property.
Def. The three lines thus proved to exist for every possible homogeneous strain are called the axes of the strain, or the strain-normals; their planes are called its normal planes; the mutual forces between parts of the body separated by these planes, or the forces on portions of the body parallel to them, are called the principal tensions.

Cor. 1. The Principal Tensions of the strain are the roots of the determinant cubic referred to in the demonstration.

Def. If the notation \( F(x, y, z) \), etc., explained above, its normal planes are the principal planes of the surface of the second degree whose equation is

\[
F(x^2 + y^2 + z^2) + 2F'x'y'z' + F''x'^2 + F''y'^2 + F''z'^2 = 0,
\]

and the principal tensions are equal to the reciprocals of the squares of the lengths of the semi-principal-axes of the same surface (quantities which are negative of course for the principal axis or axes which cut the surface when the surface is a hyperboloid of one or of two sheets).

Cor. 3. The ellipsoid whose equation, referred to the rectangular axes of a strain

\[
g - 2F'x'y'z' = 2F''x'^2 + 2F''y'^2 + 2F''z'^2 = 1,
\]

where \( F, G, H \) denote the principal tensions, and \( e \) any infinitely small quantity, represents the strain, in the following manner.

From any point \( P \) in the surface of the ellipsoid draw a line in the tangent plane half-way to the point where this plane is cut by a perpendicular to it through the centre; and from the end of the first-mentioned line draw a radial line to meet the surface at a sphere of unit radius concentric with the ellipsoid. The tension at this point of the surface of the solid is in the line from it to the point \( P \); and its amount per unit of surface is equal to the length of a small line, divided by \( e \).

Cor. 4. Any stress is fully specified by six quantities, viz., its three principal stresses \( (F, G, H) \), and three angles \( \theta, \phi, \psi \) or three numerical quantities equivalent to the nine direction cosines specifying its axes.

CHAPTER IV.—On the Distribution of Displacements in a Strain.

Prop. In every homogeneous strain any part of the solid bounded by an ellipsoid remains bounded by an ellipsoid.

For all particles of the solid in a plane remain in a plane, and two parallel planes parallel. Consequently every system of equiangular diametral planes of an ellipsoid of the solid retain the property of equiangular diametral planes with reference to the altered surfaces containing the same particles. Thus altered surface is therefore an ellipsoid.

Prop. There is a single system (and only a single system, except in the cases of symmetry) of three rectangular planes for every homogeneous strain, which remain at right angles to one another in the altered solid.

Def. 1. These three planes are called the normal planes of the strain, or simply the strain-normals. Their lines of intersection are called the axes of the strain. The elongations of the solid per unit of length along these axes are termed the normal elongations; to these planes are called the Principal Elongations of the strain.

Remark. The preceding propositions and definitions are not limited simply to ellipsoids, but are applicable to whatever extent the body may be strained.

Prop. If a body, while experiencing an infinitely small strain, be held in position, its plane fixed, and the normal planes of two parallel to three fixed rectangular planes through the point \( O \), a sphere of the solid of unit radius having this point for its centre becomes, when strained, an ellipsoid, whose equation, referred to the strain-normals through \( O \), is

\[
(1 - 2F) = 0 + (2F - 1) + (2F' - 1) = 0,
\]

if \( x, y, z \) denote the elongations of the solid per unit of length, in the directions respectively perpendicular to these three planes, and \( F, F', F'' \) on the surface of this ellipsoid, attains by any particular point of the solid, is such that if a line be drawn in the tangent plane, half-way to the point of intersection of this plane with a perpendicular from the centre, a radial line drawn through its extremity cuts the primitive spherical surface in the primitive position of that point.

Cor. 1. For every stress, there is a certain infinitesimally small strain, and conversely, for every infinitesimally small strain, there is a certain stress, namely if, while the strain in being acquired, the centre and the strain-normals through it are unmoved, the absolute displacements of particles belonging to a spherical surface of the solid of unit intensity (according to a definite convention as to units for the representation of force by lines) and in direction, the forces (reckoned as to intensity, in amount per unit of area) experienced by the enclosed sphere of the solid, at the different parts of its surface, when subjected to the stress.

Cor. 2. Any strain is fully specified by six quantities, viz., its three principal elongations, and three numerical quantities equivalent to three independent quantities specifying its axes.

Def. 2. A stress and an infinitely small strain related in the manner defined in Cor. 1, is to be of the same type, or to be of the same kind, that ellipsoid by means of which the distribution of force over the surface of a sphere of unit radius is represented in one case, and by means of which the displacements of particles from the spherical surface are shown in the other, may be called the geometrical type of either.

Cor. Any stress or strain-type is fully specified by six quantities, viz., two ratios between its principal strains or elongations and three quantities specifying the angular position of its axes.

CHAPTER V.—Conditions of Perfect Concurrency between Strains and Strains.

Def. 1. Two stresses are said to be concurrent in direction, or to be perfectly concurrent, when they only differ in absolute magnitude. The same relative designations are applied to two strains differing from one another only in magnitude, and not in type.

Def. 2. When a homogeneous stress is such that the normal component of the mutual force between the parts of the body on the two sides of any plane whatever, across it, is proportional to the augmentation of distance between the same plane and another parallel to it and initially at unit of distance, due to a certain strain experienced by the same body, the stresses so caused are said to be perfectly concurrent; also to be coincident in direction. The body is said to be yielding directly to a stress applied to it. But it is as if the strain was varying from the time it was acquired a strain directly opposed to the stress; and in the same circumstances, the matter round the body is said to be yielding directly to the reactive stress of the body upon it.

CHAPTER VI.—Orthogonal Strains and Strains.

Def. 1. A stress is said to act across a strain, or to act orthogonally to a strain, or to be orthogonal to a strain, if work is neither done upon nor by the body in virtue of the action of the stress upon it while it is acquiring the strain.

Def. 2. Two stresses are said to be orthogonal when either coincides in direction with a strain orthogonal to the other.

Def. 3. Three stresses are said to be orthogonal when either coincides in direction with a stress orthogonal to the other.

Example.—(1) A uniform central compression, and any strain involving no alteration of volume, are orthogonal to one another.

(2) A simple extension of contraction in parallel lines unaccompanied by any transverse extension or contraction, that is, "a simple longitudinal strain," is orthogonal to any similar strain in lines so situated as to be conjugate in a simple diagonal.

(3) A simple longitudinal strain is orthogonal to a "simple tangential strain," 1 in which the sliding is parallel to its direction of action.

(4) Two infinitely small simple tangential strains in the same plane, with diametral planes of sliding mutually perpendicular, are orthogonal to one another.

(5) An infinitely small simple tangential strain is orthogonal to every infinitely small simple tangential strain, in a plane either parallel to its plane of sliding or perpendicular to its line of sliding.

CHAPTER VII.—Composition and Resolution of Strains and their Relations with each other.

Any number of simultaneously applied homogeneous strains are equivalent to a single homogeneous stress which is called their resultant. Any number of superposed homogeneous strains are equivalent to a single homogeneous resultant strain. Infinitesimal small strains may be independently superposed; and in what follows it will be uniformly assumed that all strains spoken of are infinitely small, unless the contrary is stated.

Example.—(1) A strain consisting simply of elongation in one set of parallel lines, and a strain consisting of equal reduction in another set of parallel lines, either of these being acquired, the centre and the strain-normals through it are unmoved, the absolute displacements of particles belonging to a spherical surface of the solid of unit intensity (according to a definite convention as to units for the representation of force by lines) and in direction, the forces (reckoned as to intensity, in amount per unit of area) experienced by the enclosed sphere of the solid, at the different parts of its surface, when subjected to the stress.

Cor. 1. For every stress, there is a certain infinitesimally small strain, and conversely, for every infinitesimally small strain, there is a certain stress, namely if, while the strain in being acquired, the centre and the strain-normals through it are unmoved, the absolute displacements of particles belonging to a spherical surface of the solid of unit intensity (according to a definite convention as to units for the representation of force by lines) and in direction, the forces (reckoned as to intensity, in amount per unit of area) experienced by the enclosed sphere of the solid, at the different parts of its surface, when subjected to the stress.

Cor. 2. Any strain is fully specified by six quantities, viz., its three principal elongations, and three numerical quantities equivalent to three independent quantities specifying its axes.

1. That is, a homogeneous strain in which all the particles in one plane remain in their places, and other particles are displaced in the directions of angles \( (\theta, \phi, \psi) \), or three direction cosines, equivalent to three independent quantities specifying its axes.
ELASTICITY

Chapter XII.—On the Measurement of Stresses and Strains

Def. Strains of any type are said to be to one another in the same ratio as stresses of the same type respectively, when any particular plane of the solid acquires, relatively to another plane parallel to it, motions in virtue of the strains which are to one another in the same ratio as the normal components of the forces between the parts of the solid on the two sides of either plane due to the respective stresses.

Def. The magnitude of a stress and of a strain of the same type are quantities which, multiplied one by the other, give the work done upon unit of volume of a body solid on by the strain while acquiring the strain.

Cor. 1. If \( x, y, z, \xi, \eta, \zeta \) denote orthogonal components of a certain strain, and if \( P, Q, K, S, T, U \) denote components, of the same type respectively, of a stress applied to a body while acquiring that strain, the work done upon it per unit of its volume will be

\[
Ap = Pr + Qy + &c
\]

Each member must be equal to

\[
F^2 + \eta^2 + \xi^2
\]

and also equal to

\[
F^2 + \eta^2 + \xi^2
\]

When

\[
F^2 = \eta^2 + \xi^2
\]

Hence

\[
F^2 = \eta^2 + \xi^2
\]

or

\[
F^2 = \eta^2 + \xi^2
\]

or

\[
F^2 = \eta^2 + \xi^2
\]

Now we have, to express the proportionality of the stresses and strains,

\[
F = \frac{P}{x} = \frac{Q}{y} = \frac{K}{z}
\]

and the several components will be \( P, Q, K, \) &c., and therefore referring to types of reference. The

the resultant of any strain whatever belonging to the others.

Def. A normal system of types of reference is that in which the strains or stresses of the different types are all mutually orthogonal (fifteen conditions). A normal system of types of reference may also be called an orthogonal system. The elements specifying, with reference to such a system, any stress or strain, will be called orthogonal components or orthogonal coordinates.

The six types described in Example (1) of Chapter XII would, clearly orthogonal, if the parallelepiped referred to is rectangular. Those three types of strain specify the strains at the centres of the edges of the parallelepiped. The remaining three are plane distortions parallel to the three pairs of opposite faces. They constitute the system of types of reference uniformly used hitherto on the theory of elasticity.

The six strains in which a spherical portion of the solid is changed into ellipsoids having the following equations:

\[
\begin{align*}
& (1) \quad 2 (x + y + z) = 1 + \xi^2 + \eta^2 + \zeta^2

& (2) \quad x + y + z = 1 + \xi^2 + \eta^2 + \zeta^2

& (3) \quad x + y + z = 1 + \xi^2 + \eta^2 + \zeta^2

& (4) \quad x + y + z = 1 + \xi^2 + \eta^2 + \zeta^2

& (5) \quad x + y + z = 1 + \xi^2 + \eta^2 + \zeta^2

& (6) \quad x + y + z = 1 + \xi^2 + \eta^2 + \zeta^2
\end{align*}
\]

are of the same kind as those considered in the preceding example, and therefore constitute a normal system of types of reference. The ratio of the magnitude of the stress to the unit of area normal to it, will be called a stress of unit magnitude, and will be reckoned as positive when it is tension, and negative when it is compression.

Each member must be equal to

\[
F^2 + \eta^2 + \xi^2
\]

when pressure in any direction is exerted, or which is the same thing, a stress component of single longitudinal strain in planes at angles of 45° to the direction of those forces, and at right angles to one another is equal to

\[
F^2 + \eta^2 + \xi^2
\]

(2) A strain component of a simple longitudinal extension, which is a strain having the ratio \( \xi = \eta = \zeta \), and is therefore identical with the number that would be produced by a single distortion.

(3) A strain component of a simple longitudinal extension, which is a strain having the ratio \( \xi = \eta = \zeta \), and is therefore identical with the number that would be produced by a single distortion.

(4) A strain component of a simple longitudinal extension, which is a strain having the ratio \( \xi = \eta = \zeta \), and is therefore identical with the number that would be produced by a single distortion.

(5) A strain component of a simple longitudinal extension, which is a strain having the ratio \( \xi = \eta = \zeta \), and is therefore identical with the number that would be produced by a single distortion.

(6) A strain component of a simple longitudinal extension, which is a strain having the ratio \( \xi = \eta = \zeta \), and is therefore identical with the number that would be produced by a single distortion.
**ELASTICITY**

Component strains, according to the orthogonal system of types described in Example 3 (1) of Chap. IX., the resultant strain equivalent to them will be one in which a square of radius 1 in the solid becomes an ellipsoid whose equation is

\[(1 - \sigma_1^2)x^2 + (1 - \sigma_2^2)y^2 + (1 - \sigma_3^2)z^2 = \sigma_1 \sigma_2 \sigma_3 - 1,
\]

and its magnitude will be

\[\sqrt{\sigma_1^2 + \sigma_2^2 + \sigma_3^2 + \sigma_1 \sigma_2 + \sigma_2 \sigma_3 + \sigma_3 \sigma_1}.
\]

(7) The specifications, according to the system of reference used in the preceding Example, of the unit strains of the six orthogonal types defined in Example 6 of Chap. IX., are as follows:

<table>
<thead>
<tr>
<th>( x )</th>
<th>( y )</th>
<th>( z )</th>
<th>( \xi )</th>
<th>( \eta )</th>
<th>( \zeta )</th>
</tr>
</thead>
<tbody>
<tr>
<td>(I)</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>(II)</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>(III)</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>(IV)</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>(V)</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>(VI)</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

where \( x, m, n, r, s, \) and \( t, m', n', r' \) denote quantities fulfilling the following conditions:

\[-n^2 + \sigma_1^2 = 1, \]
\[m^2 + n^2 = \sigma_1, \]
\[n^2 + m^2 = \sigma_2, \]
\[m^2 + n^2 = \sigma_3, \]
\[m^2 + n^2 = \sigma_1 \sigma_2, \]
\[m^2 + n^2 = \sigma_1 \sigma_3, \]
\[m^2 + n^2 = \sigma_2 \sigma_3, \]
\[m^2 + n^2 = \sigma_1 \sigma_2 \sigma_3.
\]

If \( (1 - 13)X^2 + (2 - 2)Y^2 + (2 - 2)Z^2 = \sigma_1 \sigma_2 \sigma_3 - 1, \)

and

\[2X^2 + (1 - 2)YZ + (1 - 2)ZX + (1 - 2)XY = \sigma_1 \sigma_2 \sigma_3 - 1, \]

and the corresponding coefficients \( s, t, u, \) and \( v, w, x, y, z, \) are those functions transformed to \( x', y', z', d', e', f, \) and \( g, h, k, \) respectively.

The direction of any strain is specified by the values of the components \( x, y, z, \) chosen to be the directions of reference, and the stress is specified by the values of the components \( \xi, \eta, \zeta, \)

where \( x, m, n, r, s, \) and \( t, m', n', r' \) denote the concurrences of one of them with six orthogonal types of reference, and \( r, s, n, m, \) \( \) of the other.

**Cor. 7.** The most convenient specification of a type for stresses or strains, being in general a statement of the components, according to the types of reference, of a unit strain or stress of the type to be specified, becomes a statement of its concurrences with the types of reference when these are orthogonal.

**Examples.**—(1) The mutual concurrence of two simple longitudinal strains or stresses, inclined to one another at an angle \( \theta, \) is \( \cos \theta \)

(2) The mutual concurrence of two simple distortions in the same plane, whose axes are inclined at an angle \( \theta \) to one another, is \( \cos \theta \) and \( \cos (\theta - \phi) \), or \( \cos \theta \) and \( \cos (\theta + \phi) \), or \( \cos \theta \) and \( \cos (\theta - \phi) \), respectively, if \( \theta \) be the angle between the axes of elongation in the given distortion and in the first component type.

(3) The mutual concurrence of a simple longitudinal stress and a simple distortion is

\[\cos \theta \cos \phi \]

where \( \alpha \) and \( \beta \) be the angles at which the direction of the longitudinal stress is inclined to the axes of the distortion.

(4) The mutual concurrence of a simple longitudinal stress and of a uniform dilatation is

\[\sqrt{1 + \phi^2} \cos \theta \cos \phi.
\]

(5) The mutual concurrence of a simple stress or strain with reference to one system of types into \( x_1, x_2, x_3, x_4, x_5, x_6, \) with reference to another system of types, \( y_1, y_2, y_3, y_4, y_5, y_6, \) be the components, according to the original system, of a unit strain or the first type of the new system; let \( (e_1, e_2, e_3, e_4, e_5, e_6, \) be the corresponding specification of the second type of the new system, and let \( a, b, c, \) be the required transformation formula.

\[x_1 = a_1 e_1 + a_2 e_2 + a_3 e_3 + a_4 e_4 + a_5 e_5 + a_6 e_6,
\]

\[x_2 = b_1 e_1 + b_2 e_2 + b_3 e_3 + b_4 e_4 + b_5 e_5 + b_6 e_6,
\]

\[x_3 = c_1 e_1 + c_2 e_2 + c_3 e_3 + c_4 e_4 + c_5 e_5 + c_6 e_6.
\]

**Chapter XII.**—On the Transformation of Types of Reference for Stresses or Strains

To transform the specification of three strains of any type, \( x, y, z, \) of a stress or strain with reference to one system of types into \( x_1, x_2, x_3, x_4, x_5, x_6, \) with reference to another system of types, \( y_1, y_2, y_3, y_4, y_5, y_6, \) be the components, according to the original system, of a unit strain or the first type of the new system; let \( (e_1, e_2, e_3, e_4, e_5, e_6, \) be the corresponding specification of the second type of the new system, and let \( a, b, c, \) be the required transformation formula. Then we have:

\[x_1 = a_1 e_1 + a_2 e_2 + a_3 e_3 + a_4 e_4 + a_5 e_5 + a_6 e_6,
\]

\[x_2 = b_1 e_1 + b_2 e_2 + b_3 e_3 + b_4 e_4 + b_5 e_5 + b_6 e_6,
\]

\[x_3 = c_1 e_1 + c_2 e_2 + c_3 e_3 + c_4 e_4 + c_5 e_5 + c_6 e_6.
\]

**Example.**—The transforming equation is to pass from a specification (\( x, y, z, \) \( u, v, w, \)) in terms of the system of reference used in Examples (8) and (9), Chapter X., to a specification (\( x_1, y_1, z_1, u_1, v_1, w_1, \)) in terms of the new system described in Example (8) of Chap. IX., with the ordinary system, Examples (1) and (9), Chap. IX.

**Chapter XIII.**—On the Dynamical Relations between Stresses and Strains Experienced by an Elastic Solid.

**Interpretation of the Differential Equation of Energy.**

In a paper on the Thermo-elastic Properties of Matter, published in the first number of the Quarterly Mathematical Journal, April 1855, and republished in the Philosophical Magazine, 1877, second half year, it was proved, from general principles in the theory of the Transformation of Energy, that the amount of work (\( w \)) required to reduce an elastic solid, keep at a constant temperature, from one stated condition of internal strain to another depends solely on these two conditions, and not at all on the cycle of varied states through which the body may have been made to pass in effecting the change, provided always there has been no failure in

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the elasticity under any of the strains it has experienced. Thus for a homogeneous solid homogeneously strained, it appears that $w$ is a function of six independent variables $x, y, z, t, u, \xi$ by which the condition of the solid as to strain is specified. Hence to strain the body to the infinitely small extent expressed by the variation from $(x, y, z, t, u, \xi)$ to $(x + dx, y + dy, z + dz, t + dt, u + du, \xi + d\xi)$, the work required to be done upon it is

$$\frac{\partial w}{\partial x}dx + \frac{\partial w}{\partial y}dy + \frac{\partial w}{\partial z}dz + \frac{\partial w}{\partial t}dt + \frac{\partial w}{\partial u}du + \frac{\partial w}{\partial \xi}d\xi$$

The stress which must be applied to its surface to keep the body in equilibrium in the state $(x, y, z, t, u, \xi)$ must therefore be such that it would do this amount of work if the body, under its action, were to acquire the arbitrary strain $dx, dy, dz, dt, du, d\xi$, that is, it must be the resultant of six stresses—one orthogonal to the five strains $dx, dy, dz, dt, du$, and of such a magnitude as to do the work $\frac{\partial w}{\partial x}dx + \frac{\partial w}{\partial y}dy + \frac{\partial w}{\partial z}dz + \frac{\partial w}{\partial t}dt + \frac{\partial w}{\partial u}du + \frac{\partial w}{\partial \xi}d\xi$ when the body acquires the strain $dx, dy, dz, dt, du, d\xi$, and so on.

If $a, b, c, f, g, \theta$ denote the respective components of these six stresses, with the types of reference used in the specification $(x, y, z, t, u, \xi)$ of the strains, the amount of the six stresses which fulfill those conditions will (Chapter XI) be given by the equations

$$F=ax + bx + cy + dy + ez + dz + tw + u = 0$$

and the types of these component stresses are determined by being orthogonal to the five of the strain-tensions, wanting the first, the second, \&c., respectively.

Cor. If the types of reference used in expressing the strain of the body constitute an orthogonal system, the types of the component stresses will coincide with them, and each of the components will be unity. Hence the equations of equilibrium of an elastic solid referred to six orthogonal types are simply

$$F = ax + bx + cy + dy + ez + dz + tw + u = 0$$

**Chapter XIV.—Reduction of the Potential Energy, and of the Equations of Equilibrium, of an Elastic Solid to their Simplest Forms**

If the condition of the body from which the work denoted by $w$ is reckoned to be that of equilibrium under no stress from without, and if $x, y, z, t, u, \xi$ be chosen each zero for this condition, we shall have, by Macaulay's theorem,

$$w=H_x x + H_y y + H_z z + H_t t + H_u u + H_{\xi} \xi$$

where $H_x, H_y, H_z, H_t, H_u, H_{\xi}$ denote homogeneous functions of the second order, third order, \&c., respectively. Hence $H_xdx + H_ydy + H_zdz + H_tdt + H_udu + H_{\xi}d\xi$, will each be a linear function of the strain coordinates, together with functions of higher orders derived from $H_x, H_y, H_z, H_t, H_u, H_{\xi}$. Its expression shows (section 37 above) that, within the elastic limits, the stresses are very nearly not quite proportional to the strains they are capable of experiencing, and therefore $H_x, H_y, H_z$, may be neglected, and we have simply

$$w=H_x x + H_y y + H_z z + H_t t + H_u u + H_{\xi} \xi$$

Now in general there will be twenty-one terms, with independent coefficients, in this function, but by a choice of types of reference, that is, by a linear transformation of the independent variables, we may, in an infinite variety of ways, reduce it to the form

$$w=F_{x}x + F_{y}y + F_{z}z + F_{t}t + F_{u}u + F_{\xi} \xi$$

the simplest possible form under which they can be presented.

This condition can be expressed as follows

**Prop.** An infinite number of systems of six types of strains or stresses exist in any given elastic solid such that, if a strain of any one of these is produced, the elastic reaction is balanced by a stress system of the five others of the same system.

**Chapter XV.—On the Six Principal Strains of an Elastic Solid.**

To reduce the twenty-one coefficients of the quadratic terms in the expression for the potential energy to six by a linear transforma-

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other strain of equal amount; and the principal type to which the last corresponds is that of a strain which is manifested by a lateral shear than any other strain of equal amount in the same body. The stresses corresponding to the four other principal strain-types have each the maximum magnitude of stress, and to an amount equal to $R$, the stress required to maintain it in this state will be equal to $\pi$, where

$\Omega = (A_{\pi} + B_{\pi} + C_{\pi} + D_{\pi} + E_{\pi} + F_{\pi})$,

and will be of a type of which the concurrences with the principal types are respectively

$A_{\pi} = B_{\pi} = C_{\pi} = D_{\pi} = E_{\pi} = F_{\pi}$,

Prop. A homogeneous elastic solid, crystalline or non-crystalline, subject to magnetic force or free from magnetic force, has neither any right-handed or left-handed, nor any dipolar, properties dependent on elastic forces simply proportional to strains.

Cor. The elastic forces concerned in the luminiferous vibrations of a solid or fluid medium possessing the right- or left-handed property, whether axial or rotatory, such as quartz crystal, or tartaric acid, or solution of sugar, either depend on the heterogeneousness or on the magnitude of the strains experienced. Hence as they do not depend on the magnitude of the strains, they do depend on its heterogeneity through the portion of a medium containing a source.

Cor. There cannot possibly be any characteristic of elastic forces simply proportional to the strains in a homogeneous body, corresponding to certain peculiarities of crystalline form which have been observed,—for instance corresponding to the plagiodal faces discovered by Sir John Herschel to indicate the optical character, whether right-handed or left-handed, in different specimens of quartz crystal, or corresponding to the distinguishing characteristics of the crystals of the right-handed and left-handed tartaric acids obtained from Dr. Pasteur from racemous crystal, or corresponding to the dipolar characteristics of form and shape to have been discovered in electric crystals.

CHAPTER XVI.—Application of Conclusions to Natural Crystals.

It is easy to demonstrate that a body, homogeneous when regarded on a large scale, may be constructed to have twenty-one arbitrarily prescribed values for the coefficients in the expression for its potential energy in terms of any prescribed system of strain coordinates. This proposition was first enunciated in the paper on the Thermo-elastic Properties of Solids, published April 1855, in the Quarterly Mathematical Journal alluded to above. We may therefore subdivide the following.

Prop. A solid may be constructed to have arbitrarily prescribed values for its six Principal Elasticities and an arbitrary orthogonal system of six types, specified by fifteen independent elements, for its principal strains: for instance, five arbitrarily chosen systems of three rectangular axes, for the normal axes of five of the Principal Types; those of the sixth consequently in general distinct from all the others, and determinate, and the six times two ratios between the three stresses or strains of each type, also determinate. The fifteen equations expressing (Chap. VI.) the mutual orthogonality of the six types determine the twelve ratios for the six types, and the three quantities specifying the axes of the sixth type in the particular case here suggested: or generally the fifteen equations determine fifteen out of the thirty quantities (viz. twelve ratios and eighteen angular coordinates) specifying six Principal Types.

Cor. There is no reason for believing that natural crystals do not exist for which there are six unequal Principal Elasticities, and six distinct strain-types for which the three normal axes constitute six distinct sets of three principal rectangular axes of elasticity.

It is easy to give arbitrary illustrative examples relative to Principal Elasticities; also, to investigate the principal strain-types and the equations of elastic force referred to them or to other natural types, for a body possessing the kind of symmetry as to elastic forces that is possessed by a crystal of Iceland spar, or by a crystal of the "tesseral class," or of the included "eubel class." Such illustrations and developments, though proper for a student's text-book of the subject, are unnecessary here.

For applications of the Mathematical Theory of Elasticity to the question of the earth's rigidity and elasticity as a whole, and to the equilibrium of elastic solids in general, which are beyond the scope of the present article, the reader is referred to Thomson and Tait's Natural Philosophy, §§ 555, 740, 823, 849, and Appendix C.

CHAPTER XVII.—Plane Waves in a Homogeneous Isotropic Solid.

A plane wave in a homogeneous elastic solid is a motion in which every line of particles in a plane parallel to one fixed plane ex-
ELATERICUM, a drug consisting of a sediment deposited by the juice of the fruit of *Eclatium Elaterium*, the squiring cucumber (see vol. vi. p. 698.) To prepare it, the fruit is sliced lengthwise and slightly pressed; the gummy and slightly turbid juice thus obtained is strained and set aside; and the deposit of elaterium formed after a few hours is collected on a linen filter, rapidly drained, and dried on porous tiles at a gentle heat. Elaterium is met with in commerce in light, thin, friable, and curved opaque cakes, of a greyish-green colour, bitter taste, and teasel-like smell. The best kind is the English, prepared at Hitchin, Market Deeping, Mitcham, and elsewhere; the Maltese is generally very inferior. Elaterium is an exceedingly powerful hydrogogue and purgative, and not unfrequently produces vomiting.

Its active principal is *elaterin*, a crystallizable body of the formula $C_8H_9O_8$.

ELBA, the *Aphalea* of the Greeks, and Iva of the Romans, is an island in the Mediterranean Sea, forming part of the Italian province of Livorno, and lying about 6 miles from the mainland of Italy, from which it is separated by the channel of Piombino, and about 34 miles E. of Corsica. It has a very irregular coast outline, 18 1/2 miles long and 23 to 10 1/2 miles broad, and has a total area of nearly 90 square miles. It is throughout mountainous, and the highest point, Monte Capanee, is 2935 feet above sea-level. The western portion of the island is granitic, the eastern consists mainly of the sandstone locally known as *erroneo*, which in some places passes into a tale slate. In the vicinity of Porto Ferrajo the cliffs are cactaceous. The climate is mild, and, except at some spots on the coast, healthy. Springs are numerous, and the soil is not infertile; but agriculture and cattle-rearing are neglected, and there are no manufactures. Wine, wheat, aloe, dyer's lichen, and olives and other fruits are produced. The sardine and tunny fisheries, and the manufacture of sea-salt are of some importance; but the principal industry is mining. The iron mines are mostly in the vicinity of Rio Inferiore, and yield abundance of ore, chiefly hematite, of excellent quality. On account of the lack of fuel the ore is not smelted on the island, but is shipped direct to Follonica on the neighbouring coast of Italy, and to the port of Florence and England, A. Marble, alabaster, sulphur, and ores of tin, lead, and silver are among the other mineral products. The principal places in Elba are the chief town Porto Ferrajo, with about 5000 inhabitants, the residence of Napoleon from May 4, 1814, to February 26, 1815, Rio Ferrajo, San Petro, Porto Longone, and the village of Capoliveri. The population of the island in 1871 was 21,755.

The Argonauts, in quest of Circe are said to have loaded at Portus Aegon (Argaeum Lycaon), now Porto Ferrajo, in Elba. The island was early famous for the richness of its mines, alluded to by Virgil (Eg., x. 178). It was attacked by Phaëthon with a Syracusan fleet, 453 m. o., and subsequently by Apelles, who is stated to have sung it. In the 10th century it became a possession of Fussia, from whom it was taken by the Genoese in 1596. It fell eventually into Spanish hands, came in 1776 under the jurisdiction of Naples, and in 1801 was ceded to the king of Etruria by the Treaty of Ermens on the cession of Elba. It was united to France in 1807, restored to Napoleon by the Treaty of Paris in 1814, restored to Tuscany in the following year, and in 1860 annexed to Italy.

ELBE, the All of the Romans and the Labe of the Bohemians, a large river of Germany, with a total length of 705 miles, and a drainage area of about 55,000 square miles. It rises in Bohemia not far from the frontiers of Saxony, on the southern side of the Riesengebirge or Giants' Mountains, in $50^0 46' W$. lat. and $15^0 39' E$. long., and discharges into the Elbe at Radebeul. The numerous small streams (Seifen or Flessen, as they are named in the district) whose confluent waters compose the infant river, the most important are the Weisswasser, or White Water, and the Elbselzen; the former runs to the S.W. of the Schneekuppe in the White Meadow, and in a stone fountain in the Elbe Meadow. Augmented successively by the Adler, the Iser, the Moldau, and the Eger, it cuts its way through the Mittelgebirge of Bohemia, traverses the sandstone mountains of Saxon Switzerland, and with a general N.W. direction continues to meander through Saxony, Anhalt, and Hanover, until at length it falls into the German Ocean about $53^0 5' N.$ lat. and $8^0 50'$ E. long. The principal towns on its banks are Leitmeritz, Pirna, Dresden, Meissen, Torgau, Wittenberg, Magdeburg, Wittenbergs, Harburg, Hamburg, and Altona. A short distance above Hamburg the stream divides into a number of branches, but they all reunite before reaching the ocean. At its source the Elbe is about 4600 feet above the level of the sea; after the first 40 miles of its course it is still 698 feet; but at Dresden it is only 279, and at Arnsberg in Brandenburg only 176. At Rouge grants the width is about 100 feet, at the mouth of the Moldau about 300, at Dresden 960, and at Magdeburg over 1000. The tide is perceptible almost to Geesthacht. Of the fifty and more tributaries belonging to the system the most important are the Moldau, the Eger, the Mulde, and the Saale,—the Moldau having a course of 267 miles, the Eger of 235, the Mulde of 185, and the Saale of 229. Though the channel in some places, and especially in the estuary, is encumbered with sandbanks and shallows, the Elbe is of great importance as a means of communication, steamboats being able to ascend the main stream as far as Melnicz, and to reach Prague by means of the Moldau. Some idea of the extent of its traffic may be obtained from the statement that in 1870 at Schandau 489 passenger steamers and 2658 vessels and barges of various kinds passed up the stream, and 409 passenger steamers, 2965 ships, and 1505 rafts down the stream. By one line of canal it communicates with Lübeck, by another with Bremen, and by others with the great network of Mecklenburg and Brandenburg; and several new lines are projected, by which a direct way will be opened up to Hanover, Leipzig, and various other important cities.

For further see Dr Th. H. Schunké’s "Die Schiffahrts-Kanale im Deutschen Reich," in Petermann’s *Mittheil*, 1877.

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ELBERFELD, a manufacturing town of Rhenish Prussia in the government of Düsseldorf, situated in the narrow valley of the Wupper, about 19 miles E. of the town of Düsseldorf on the Berg and Mark railway. Though for the most part of modern erection, it has a large number of irregular and narrow streets, and altogether presents rather an unprepossessing appearance; the very river, polluted as it is with the refuse of dye-works and factories, rather incrasing the unsomeness. The newer quarters, however, must be excepted from this description, and many of the public buildings are large and handsome. Of these the most important are the town-house, in the modern Renaissance style, the provincial court, the exchange, the post office, the orphanage, the lunatic asylum, St Joseph's hospital, the infirmary, the Female Society's hospital, the railway company's offices, the gymnasium, and the technical school. The educational institutions include 27 popular schools where no fees are paid, and the whole system of relief for the poor is so well arranged that it has excited imitation in several towns in Germany. A great variety of textile fabrics in cotton, wool, and silk are manufactured on an extensive scale; and besides dye-works and chemical works of proportionate importance, there may be mentioned button-factories, lace-factories, a brewery, a foundry, and soap-works. The town is the seat of a considerable number of industrial, philanthropic, intellectual, and religious institutions, among which the most noticeable are the public library, the museum, and the Berg Bible Society. The inhabitants are mainly Protestants, with a strong tendency towards Pietism; but the Roman Catholics number upwards of 14,000, and the Jewish community has recently erected a new synagogue. The Elberfelder Zeitung and several other newspapers are published in the town. In 1840 the population was 31,614; in 1864, 63,300; and in 1875, 80,599.

The site of Elberfeld was marked in the 13th century by a castle belonging to the lords of Elverfeld, which was afterwards united with the Berg possessions, and held in connexion with the Low Elbe. But it was not till the fourth century that the nucleus of the present industrial development was formed by the establishment on the banks of the Wupper of the Elberfelder Verein, a manufacturing corporation in 1832. Municipal rights were granted in 1819, a great increase of the manufactories ensued in the beginning of the 19th century, silk-weaving introduced in 1765, and the dyers of Turkey red commenced in 1778. The old town was probably occupied from the end of the 14th century. It continued until the 18th century to be the scene of a considerable commerce. A suspension bridge communicates with St Aubin, and steam-boats ply regularly to Rouen. The population, which was only about 4,600 in the end of last century, amounted in 1851 to 10,238, and in 1872 to 22,563. In the quasi-suburban towns of Candehec-lès-Elbeuf, Saint-Pierre-lès-Elbeuf, and Saint Aubin-jouxe-Boulleng be included, this great industrial congeries will comprise upwards of 39,000 inhabitants.

Elbeuf, a town of France in the department of Seine-Inferieure, 13 miles S. of Rouen, on the left bank of the Seine, with a station on the railway between Oissel and Serquigny. It has three parish churches, a Protestant place of worship, a town-house with a natural history museum, a public library, a hospital, an industrial society, and a chamber of arts and sciences. The churches of St Etienne and St Jean are both of some antiquity, and preserve stained glass of the 15th and 16th centuries. The town is one of the principal seats of the woolen manufacture in France: more than half of the inhabitants are directly maintained by the staple industry, and numbers more by the auxiliary crafts. As a river-port it has a brisk trade in the produce of the surrounding district as well as in the raw materials of its manufactures. A suspension bridge communicates with St Aubin, and steam-boats ply regularly to Rouen. The population, which was only about 4,600 in the end of last century, amounted in 1851 to 10,238, and in 1872 to 22,563. In the quasi-suburban towns of Candehec-lès-Elbeuf, Saint-Pierre-lès-Elbeuf, and Saint Aubin-jouxe-Boulleng be included, this great industrial congeries will comprise upwards of 39,000 inhabitants.

Elbing, a seaport town of Prussia, at the head of a circle in the government of Danzig, 36 miles E.S.E. of the city of that name, on the Elbing, a small river which flows into the Frische Haff about four miles from the town, and is united with the Nogat or eastern arm of the Vistula by means of the Krafold canal. The old town was formerly surrounded by fortifications, but of these only a few fragments remain. There are seven Evangelical, one Roman Catholic, and two Mennonite churches, a synagogue, a gymnasium founded in 1536, with a public library of
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22,000 volumes, an orphan-asylum, several hospitals, and numerous charitable institutions. Of these last a number owe their existence to the bequests of an Englishman, Richard Cowles, who settled in the town in 1810 and died at Dartmouth in 1821. The manufacturing industry is extensive and varied, producing, among the rest, many goods, iron ships, and machinery, sailcloth, woollen cloth, leather, paper, tobacco, starch, vitriol, and vinegar, and the transit trade has received a considerable increase by the opening of the Overland canal (1846–1861).

The existence of Elbing is due to a colony of Lubbeck traders who settled under the protection of the castle of the Teutonic Knights in 1237. Invited with the Lubbeck rights, and afterwards admitted into the Hanseatic confederation, the settlement was highly prosperous, and in 1335 greatly extended its limits by laying out a New Town. In 1494 it paid allegiance to Poland, and in 1544 was made the seat of a bishopric by Albert of Brandenburg, Grand Master of the Teutonic Order. After various vicissitudes, it came at last to Prussia in 1772—decadent and declining, and its present prosperity is of quite recent date. Population in 1875, 32,572.

ELCIE, a town of Spain, in the province of Alcântara, six miles from the sea, on the river Vinalap. It has three churches, as many monastic buildings, a hospital, barracks, and an old spacious palace; but there is nothing of architectural interest except perhaps the portico of Santa Maria. The costume and physiognomy of the inhabitants, the narrow streets and flat-roofed white-washed houses, and more than all the thousands of palm-trees in its gardens and fields, give the place a strikingly Oriental aspect, and render it unique among the cities of Spain. The cultivation of the palm is indeed the principal occupation, and though the dates are inferior to those of Barbary, the annual value of the crop is about £14,000. The blanched fronds are also sold in large quantities for the pneumatics of Palma and the South of Italy. For the rest, they bear the blessing of the priest, they are regarded throughout Spain as certain defences against lightning.

Eliezer is identified with the ancient Ilon or Illy of the Contestaites, which under the Romans obtained the rank of a colony with the title Itacum. In 1338 it was attacked by the Moors of Granada, who discharged against it "ruin bolts through fire" Population 18,734.

ELDAD BEN MALCHI, also surnamed Ha-Dani, Aba-Dani, Daud-Ha-Dam, or the Daimie, a Jewish traveller of the 9th century of the Christian era, chiefly interesting on account of the light (or darkness) which his writings throw on the question of the Lost Tribes. The date and place of his birth are not accurately known; but he was a native either of South Arabia or of Media. About 850 he set out with a companion to visit his Jewish brethren in Africa and Asia. Their vessel was wrecked, and they fell into the hands of cannibals, but Eldad was saved from the inhuman fate of his comrade, first by his lenience and afterwards by the opportune invasion of a neighbouring tribe. He spent four years with his new captors, was ransomed by a fellow-countryman, continued his journey as far, according to one interpretation of his story, as Chaffa, spent several years at Kairwan in Tunis, and died on a visit to Cordova in Spain. The work which goes under his name is written in Hebrew, and consists of six chapters, probably abbreviated from the original form of the narrative. It was first printed at Constantinople in 1518; and the same recension afterwards appeared at Venice in 1540 and 1605, and at Jesenitz in 1722. A Latin version by Genebrard was published at Paris in 1653, under the title of Eldad Daniebus de Judæis elationibus, or Ethique emperorum, and was afterwards incorporated in the translator's Chronographia Hebraeorum; a German version appeared at Prague in 1695, and another at Jesenitz in 1723. In 1838 M. Carmoly edited and translated a fuller recension which he had found in a MS. from the library of Eleinzer Ben Hasan, forwarded to him by Daud Zabach of Morocco. Both forms are printed by Dr. Jellinek in his Beth-IHa Medrash, vol. iv. and in. Leipzig, 1853–55. One of the most curious passages in the work is the account of the Levites, who, says the author, were miraculously guided to the land of Havila, and are there protected from their enemies by the mystic river Salbatron, which on the Salath is calm and involved in delusive mists, and on the other days of the week runs with a fierce and fordless current.


ELDER, the name of an office both in the Jewish and in the Christian church, which is used in modern times only by Presbyterians. As first applied, among the ancient Jews, for example, it had no doubt a literal fitness, indicating the responsibility and authority that natural acquire in any community to those advanced in age. As the office gradually came to be fixed in its character and limited in the number of its occupants, the name lost something of its literal fitness, the responsibility and authority becoming attached to it without regard to the age of the occupant. In this respect the kindred terms alderman, senator, etc., have had a similar history. In the Old Testament usage of the word it is impossible to fix any exact point of time at which it passed from its primary or etymological to its secondary or official sense, as the process was a gradual one, and old age continued to be regarded as the mark of the elder, as it is in modern English.

In Exodus xi. 16 elders are mentioned as a recognized official body among the Israelites, and in subsequent notices (Ex. xix. 7; Ex. xxxiv. 1; Deut. xxxi. 9) they appear as the representatives of the whole body of the people. In Numbers xii. 16, 17, seventy elders, to be chosen out of the entire body, were set apart "to bear the burden of the people" along with Moses. It is unnecessary to enter here into any discussion of the most question of the connection of this Mosaic council of seventy with large though undefined legislative and executive powers with the Sanhedrim as it existed at the time of Christ. From the time of the institution of the Mosaic council the elders are mentioned at each successive stage of Jewish history. After the settlement in Canaan they acted as the administrators of the laws in every city (Deut. xix. 11–12, xxii 3–9, 19, xxiii. 15–21) and references to them are frequent during the period of the judges and the kings, during the captivity, and after the restoration. In the New Testament the word is used to denote both an order of the Jewish economy and an office of the Christian church. Its precise significance in the latter usage is the main subject of the standing controversy between Episcopolians and Presbyterians, and a statement of the arguments on either side belongs properly to the articles on Episcopal and Presbyterian, respectively. Reference must also be made to the article on Presbytery for a full statement of the qualifications, duties, and powers of elders in a presbyterian church. It may be noted here that while the New Testament word presbyteros denotes, according to the admission of the adherents of all forms of church government, those especially set apart to the pastoral office, whatever else it may be held to include, its English equivalent elder is used as an official designation only in the presbyterian church. According to the presbyterian theory of church government there are two classes of elders, teaching elders, or those set apart specially to the pastoral office, and ruling elders, who are laymen, chosen generally by the congregation, and set apart by ordination to be associated with the pastor in the oversight and government of the church. When the word is used without any qualification, it is understood to apply to the latter class alone.
ELDER (Ang.-Sax. ellon; Gen. Holunder; Fr. sureau), the popular designation of the deciduous shrubs and trees constituting the genus Sambucus of the natural order Caprifoliaceae. The Black-berried or Common Elder, S. nigra, the bountree of Scotland, is found in Europe, the north of Africa, Western Asia, the Caucasus, and Southern Siberia, in sheltered spots it attains a height of 30 to 50 feet. The bark is smooth; the shoots are stout and angular, and the leaves glabrous, pinnate, and generally oval or elliptical. The flowers, which form corymbose cymes, with five main branches, have a cream-coloured, gamopetalous, five-lobed corolla, five stamens, and three sessile stigmas; the berries are purplish-black, globular, and three- or four-seeded, and ripen about September. The elder thrives best in moist, well-drained situations, but can be grown in a great variety of soils. It is propagated by young shoots, which after a year are fit for transplantation. It is found useful for making screen-fences in black, exposed situations, and also as a shelter for other shrubs in the outskirts of plantations. By clipping two or three times a year, it may be made close and compact in growth. The young trees furnish a brittle wood, containing much pith; the wood of old trees is white, hard, and close-grained, and polishes well, and is employed for shoemakers' pegs, combs, skewers, mathematical instruments, and turned articles. Young elder twigs deprived of leaves have from very early times been in request for making whistles, popguns, and other toys.

The elder was known to the ancients for its medicinal properties, and in England the inner bark was formerly administered as a cathartic. The flowers (Sambucus flores) contain a volatile oil, and are reputed to be diaphoretic in properties; they serve for the preparation of an emetic (sambuci emesis), and for the distillation of elder-flower water (Sambuci olusatum), used in confectionery, perfumes, and medicines. The leaves of the elder are employed to impart a green colour to fat and oil (sambuci folium et oleum suared), and the berries for making wine, a common adulterant of porter. The leaves and bark emit a sickly odour, beloved to be repugnant to insects. Christopher Gallif (Phil. Trans., 1722, lxi. p. 348) recommends that cabbages, turnips, wheat, and fruit trees, to preserve them from caterpillars, flies, and blight, should be whipped with twigs of young elder. According to German folk-lore, the hay must be doffed in the presence of the elder-tree, and in certain of the Saxon dialects of England it was believed once prevalent that the cross of Christ was made from its wood, which should therefore never be used as fuel, or treated with disrespect (see Quart Rev., xxx, 239). It was, however, a common medieval tradition, alluded to by Ben Jonson, Shakespeare, and other writers, that the elder was the tree on which Judas hanged himself; and as such it was accounted, probably to be, by the elder times accounted a disgrace. In Cymbeline (act iv. sc. 2) "the stinking elder" is mentioned as a symbol of disgrace. In Denmark the tree is sacred, and the branches must be under the protection of the "Elder-mother:" its flowers may not be gathered without her leave; its wood must not be employed for any household furniture; and a child sleeping in an elder-wood cradle would certainly be strangled by the Elder-mother.

S. nigra sylvestris is a variety of S. nigra having white bark and green-coloured berries; some ornamental varieties have blotted leaves. The Scarlet-berryed Elder, S. racemosa, is the handsomest species of its genus. It is a native of various parts of Europe, growing to 15 feet, and often producing 100 fruit. The Dwarf Elder or Danewort, S. Ebulus, a common European species, reaches a height of about 6 feet. Its cyme is hairy, by three principal branches. It is smaller than that of S. nigra; the flowers are of a dull purplish hue. All parts of the plant areathartic and emetic.

ELDON, JOHN SCOTT, BARON, and afterwards Earl of Eldon (1751–1838), lord high chancellor of England, was born at Newcastle on the 4th June 1751. His grandfather, William Scott, of Sandgate, a suburb of Newcastle, was clerk to a coal-fitter, in which service he obtained the freedom of Newcastle, became a member of the guild of Hoostmen; later in life he became a principal in the business, and attained a respectable position as a merchant in Newcastle, accumulating property worth nearly £20,000. He was twice married; his second wife, the mother of John Scott, says Lord Campbell (Lord Chancellors, vol. vii. p. 4), "was a woman of such superior understanding, that to her is traced the extraordinary talent which distinguished her two sons, William and John—Lord Stowell and Lord Eldon." It may be mentioned that William and John had each of them a twin sister.

The boys were educated at the grammar school of their native town, where, however, they scarcely gave promise of the splendid careers which they were destined to run. John Scott was not remarkable at school for application to his studies, though his wonderful memory enabled him to make good progress in them; he frequently played truant, and was whipped for it, robbed orchards, and indulged in other questionable school-boy freaks; nor did he always come out of his escapes with honour and a character for truthfulness. When John had finished his education at the grammar school, his father thought of apprenticing him to his own business, to which an elder brother Henry had already devoted himself, and it was only through the interference of William, who had already obtained a fellowship at University College, Oxford, that it was ultimately resolved that he should devote himself to the prosecution of his studies. Accordingly, on the 15th May 1766, John Scott entered University College as a commoner, with the view of entering the church, and obtaining a college living. In the year following he obtained a fellowship, graduated B.A. in 1770, and in 1771 won the prize for the English essay, the only university prize open in his time for general competition. It does not appear, however, that he distinguished himself at college any more than he had done at school by any severe application to study. It was not till after his marriage that he first concentrated his energies on the conduct of his studies. Accordingly, on the 15th November 1772, Scott, with the aid of a ladder and an old friend, carried off the lady from her father's house in the Sandhill, across the border to Blackshiel, in Scotland, where they were married. The father of the bridegroom objected not to his son's choice, but to the time he chose to marry; for it was a blight on his son's prospects, depriving him of his fellowship and his chance of church preferment. But while the bride's family refused to hold court with the pair, Mr. Scott, like a prudent man and an affectionate father, set himself to make the best of a bad matter, and received them kindly, settling on his son £2000. John returned with his wife to Oxford, and continued to hold his fellowship for what is called the year of grace given after marriage, and added to his income by acting as a private tutor. After a time Mr. Surtees was reconciled with his daughter, and made a liberal settlement on her. John Scott's year of grace closed without any college living falling vacant; and with his fellowship he gave up the church, and turned to the study of law. He became student at the Middle Temple in January 1773, and in February took his degree of M.A. at Oxford. In 1776 he was called to the bar, intending at first to establish himself as an advocate in his native town, a scheme which his early success led him to abandon, and he soon settled to the practice of his profession in London, and on the Northern Circuit. Thus, at last, had his stumbles on the high road to the chancellorship, having narrowly escaped becoming a coal-fitter, a country parson, a provincial barrister, and, according to one account, a retailer of figs and raisins.
In the autumn of the year in which he was called to the bar his father died, leaving him a legacy of £1000 over and above the £2000 previously settled on him. He was already an excellent lawyer, and succeeded fairly well on his first circuit, though not so well as to satisfy him of the safety of attempting a London career. He therefore took a house in Newcastle, with the view of establishing himself there, but still delayed to leave London; and his prospects there suddenly improving, he assigned the Newcastle house to his brother Henry. In his second year at the bar his prospects began to brighten. His brother William, who by this time held the Camden professorship of ancient history, and enjoyed an extensive acquaintance with men of eminence in London, was in a position materially to advance his interests. Among his friends was the notorious Bowes of Gisburn, to the patronage of whose house the rise of the Scott family was largely owing. Bowes having contested Newcastle and lost it, presented an election petition against the return of his opponent. Young Scott was retained as junior counsel in the case, and though he lost the petition he did not fail to improve the opportunity which it afforded for displaying his talents. This engagement, in the commencement of his second year at the bar, and the dropping in of occasional fees, must have raised his hopes; and he now abandoned the scheme of becoming a parliamentary barrister. A year or two of dull drudgery and few fees followed, and he began to be much depressed. But in 1780 we find his prospects suddenly improved, by his appearance in the case of Ackroyd v. Smithson, which became a leading case settling a rule of law, and young Scott, having lost his point in the inferior court, insisted on arguing it, on appeal, against the opinion of his clients, and carried it before Lord Thurlow, whose favourable consideration he won by his able argument. The same year Bowes again retained him in an election petition; and in the year following Scott greatly increased his reputation by his appearance as leading counsel in the Chitherson election petition. From this time his success was certain. In two years he obtained a silk gown, and was so far cured of his early modesty that he declined accepting the king's counsellorship if precedence over him were given to his junior, Mr Erskine, though the latter was the son of a peer and a most accomplished orator. He was now on the high way to fortune. His health, which had hitherto been indifferent, strengthened with the demands made upon it, his talents, his power of endurance, and his ambition all expanded together. He enjoyed a considerable practice in the northern part of his circuit, before parliamentary coroners, in matrimonial cases, and at the Chancery bar, and was in sight of the honours and emoluments of the solicitor and attorney generalships. By 1787 his practice at the Equity bar had so far increased that he was obliged to give up the eastern half of his circuit (which embraced six counties), and attend it only at Lancaster.

Shortly after taking the silk gown, he entered Parliament for Lord Wemyss's close Bordeaux of Weobley, which Lord Thurlow obtained for him without solicitation. In Parliament he gave a general and independent support to Pitt. He delivered parliamentary speeches, and was directed against Fox's India Bill. They were unsuccessful. In one he aimed at being brilliant; and becoming merely laboured and pedantic, he was covered with ridicule by Sheridan, from whom he received a lesson which he did not fail to turn to account. In 1788 Pitt conferred upon him the honour of knighthood and the office of solicitor-general; and at the close of this year he attracted attention by his speeches in support of Pitt's resolutions on the state of the king (George III, who then laboured under a mental malady) and the delegation of his authority. It is said that he drew the Regency Bill, which was introduced in 1789. In 1793 Sir John Scott was promoted to the office of attorney-general, in which it fell to him to conduct the memorable prosecutions for high treason against British sympathisers with French republicanism.—amongst others, against the celebrated Horne Tooke. These prosecutions, in most cases, were not instigated by Sir John Scott, and were the most important proceedings in which he was ever professionally engaged. He has left on record, in his Anecdote Book, a defence of his conduct in regard to them. A full account of the principal trials, and of the various legislative measures for repressing the expressions of popular opinion for which he was more or less responsible, will be found in Twiss's Public and Private Life of the Lord Chancellor Eldon, and in the Lives of the Lord Chancellors, by Lord Campbell. In 1799 the office of chief-justice of the Court of Common Pleas falling vacant, Sir John Scott's claim to it was not overlooked; and after seventeen years' service in the Lower House, he entered the House of Peers as Baron Eldon. In February 1801, the ministry of Pitt was succeeded by that of Addington, and the chief-justice now ascended the woolsack. The chancellorship was given to him professively on account of his notorious anti-Catholic zeal. From the Peace of Amiens (1801) till 1804, Lord Eldon appears to have interfered little in politics. In the latter year we find him conducting the negotiations which resulted in the despatch of Addington and the recall of Pitt to office as prime minister. Lord Eldon was continued in office as chancellor under Pitt, but the new administration was of short duration, for on the 23rd of January 1806 Pitt died, worn out with the anxieties of office, and his ministry was succeeded by a coalition, under Lord Grenville. The death of Fox, who became foreign secretary and leader of the House of Commons, soon, however, broke up the Grenville administration; and in the spring of 1807, Lord Eldon once more, under Lord Liverpool's administration, returned to the woolsack, which, from that time, he continued to occupy for about twenty years, swaying the Cabinet, and being in all but name prime minister of England. It was not till April 1827, when the premiership, vacant through the paralysis of Lord Liverpool, fell to Mr Canning, the chief advocate of Roman Catholic emancipation, that Lord Eldon, in the seventy-sixth year of his age, finally resigned the chancellorship. When, after the two abortive administrations of Canning and Goderich, it fell to the duke of Wellington to construct a Cabinet, Lord Eldon expected to be included, if not as chancellor, at least in some important office, but he was overlooked, at which he much charged, and, supporting his frequent protests that he did not covet power, but longed for retirement, we find him again, so late as 1836, within three years of his death, in hopes of office under Peel. He spoke in Parliament for the last time in July 1834.

In 1821 Lord Eldon had been created earl by George IV., whom he managed to conclude, partly, no doubt, by espousing his cause against his wife, whose advocate he had formerly been, and partly through his reputation for zeal against the Roman Catholics. In the same year, his brother William, who from 1798 had filled the office of judge of the High Court of Admiralty, was raised to the peerage under the title of Lord Stowell.

Lord Eldon's wife, his dear "Bessy," her love for whom is a beautiful feature in his life, died before him, on the 28th June 1831. By nature she was of simple character, and by habits acquired during the early portion of her husband's career almost a recluse. Two of their sons reached maturity,—John, who died in 1805, and William Henry John, who died unmarried in 1832. Lord Eldon himself survived almost all his immediate relations. His brother William died in 1836. He has
self died, in London, in his eighty-seventh year, on the 
13th January 1838, leaving behind him two daughters, 
Lady Frances Bancks and Lady Elizabeth Repton, and 
his grandson, who succeeded him. "When his remains 
lay in state in Hamilton Place," says Lord Campbell, 
"large numbers of all classes went to see the solemn 
scene; and when the funeral procession, attended by 
the carriages of the princes of the blood, many members 
of the peerage, and all the dignatures of the law, blackened 
the way, dense crowds stood uncovered, respectfully gazing 
at it as it passed." His remains were interred in the family 
vault in the chapel of Kingston, in Dorsetshire. The 
fame which he left behind him exceeded in amount half 
a million of money.

Lord Eldon was no legislator,—his one aim in politics 
was to keep in office, and maintain things as he found 
them; and almost the only laws he helped to pass were 
laws for popular coercion. For nearly forty years he 
fought against every improvement in law, or in the 
constitution,—calling God to witness, on the smallest proposal of 
reform, that he foresaw from it the downfall of his 
country. Without any political principles, properly so 
called, and without interest in or knowledge of foreign 
affairs, he maintained himself and his party in power for 
an unprecedented period by his great tact, and in virtue of 
his two great political properties,—of zeal against every 
species of reform, and zeal against the Roman Catholics. 
To pass from his political to his judicial character is to 
shift to ground on which his greatness is universally 
acknowledged. His judgments, which have received as 
much praise for their accuracy as abuse for their clumsi­ness 
and uncouthness, fill a small library. But though 
inintimately acquainted with every nook and cranny of the 
English law, he never carried his studies into foreign fields, 
from which to enrich our legal literature; and it must be 
added that against the excellence of his judgments, in too 
too many cases, must be set off the hardships, worse than 
inhumanities, that arose from his protracted delays in pronouncing 
them. A consummate judge and the narrowest of politicians, 
he was doubt on the bench and promptness itself in the 
political arena. For literature, as for art, he had no feeling. 
What intervals of leisure he enjoyed from the cares of office 
filed up with newspapers and the gossip of old cronies. 
Nor were his intimate associates men of refinement and 
taste, they were rather good fellows who quietly enjoyed a 
good bottle and a joke; he uniformly avoided encounters of 
wit with his equals. He is said to have been parsonious, 
and certainly he was quicker to receive than to reciprocate 
hospitalities; but his mean establishment and mode of life 
are explained by the retired habits of his wife, and her 
dishake of company. His manners were very winning and 
courtly, and in the circle of his immediate relatives he is 
said to have always been lovable and beloved. "He is one," says Miss Martinez, "that after times will not 
venerate; but fortunately for the fame of the larger num-

END OF VOLUME SEVENTH.