

MYSORE GAZETTEER

MYSORE

A GAZETTEER COMPILED
FOR GOVERNMENT

REVISED EDITION.

BY

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VOL. I

MYSORE IN GENERAL

Westminster

ARCHIBALD CONSTABLE AND COMPANY

2 WHITEHALL GARDENS S. W.

MDCCCXCVII

U 224k

D7.1.

50932 .

PRINTED BY
WOODFALL AND KINDER, LONG ACRE
LONDON

P R E F A C E

WHEN the former edition of this work was published, I little expected to be called on, twenty years later, to revise it. And Mysore in the interval has undergone such great and radical changes, and so much has been added to our knowledge of its past by recent discoveries, that what appeared in the prospect a comparatively easy task has proved to be in reality one of considerable difficulty, and involving for its completion a longer period than was anticipated, especially as I have been at the same time engaged on other duties of an exacting nature.

While the general arrangement of the work in the original edition has been adhered to, nearly every part has been either entirely re-written or greatly altered and extended. But the present edition is confined to the State of Mysore, and does not, as before, include Coorg. In the first volume, the section on Geology was in the press before the appointment of Mr. Bruce Foote to Mysore was known to me or he had arrived here, otherwise I would gladly have handed over that special subject to him for revision. His views are, however, quoted in the Addenda at the end of the second volume. Most parts of the sections on Flora, Fauna and Ethnography have been entirely re-written in accordance with the latest information. So also, in an especial manner, the chapters on History and Literature : the former having been greatly added to in both the most ancient and the most modern periods ; while the latter is almost entirely new. The chapter on Administration has been revised throughout and brought up to date with as much fulness as could be done in the space at disposal. The Appendix on Coins is mostly new. In the second volume, there has been a close and general revision of local details, the topical changes of recent years having been both frequent and extensive. In the Glossary at the end have been included new terms of the Revenue Survey.

Of the country which forms the general subject of the work, it cannot be denied that public interest in it has much increased since the former edition of this work appeared, its enlightened progress and its prominent position as a chief Native State in India having excited general attention. But, apart from this, there are not wanting in the

country intrinsic elements of attraction which have given it importance in the past. On first joining the service here I was considerably disappointed to be told, on inquiring from persons supposed to be acquainted with the subject, that Mysore had no history, was quite a modern State, and virtually unknown before the wars with Haidar and Tipu brought it into prominence. As regards its language and literature, also, I was led to suppose that the language was merely a rude dialect of Tamil, and that literature it had none. Of the accuracy of these views I had doubts at the time, and how completely opposed they were to actual facts the present work will, it is hoped, serve to make clear. For the researches in which I have been for long engaged have brought to light a body of evidence which carries back the history, with scarcely a break in the sequence, as far as to the 3rd century B.C., while the language is found to have been highly cultivated at probably an earlier date than any other South Indian vernacular, and to be replete with a literature of great volume and interest.

If there be any truth in the observation that small countries with diversified and distinctive physical characteristics have played the greatest part in the world's history, and given rise to its most distinguished men,—Greece, Palestine, England and others being quoted as instances,—Mysore, it seems to me, may fairly claim a place in the category. Not only does she abound in the picturesque features of lofty mountains and primeval forests, of noble rivers and mighty cataracts, but—to mention only a few of the products specially pertaining to her—she yields by far the most gold of any country in India, and her treasure in the past, carried off to the north by Musalman invaders, may have found its way to Central Asia among the spoils of Tartar hordes; she is the peculiar home of the sandal and also of teak, a special haunt of the elephant, rears a famous and superior breed of horned cattle, supplies as the staple food of her people the nutrient grain of *râgi*, was the cradle in India and is still the chief garden for coffee cultivation. Thus in every department of the natural world she may claim some pre-eminence. In the fine arts she has produced marvellous examples of architecture and sculpture. In relation to humanity, again, she has been to the two greatest Hindu reformers a home for the monastery of one, and an asylum to the other. Nearly every form of faith, from Buddhism and Jainism to Islam, has here had its day, and she is now known as having largely adopted and still strongly holding a special cult of native origin not conforming to Brahmanism. The Malnâd region of Mysore has been the birthplace of royal races dominant in the south—the Kadambas, the Hoysalas, and perhaps also the Vijayanagar sovereigns. In modern times, the great general of the

age—the Iron Duke, learned in the Malnád wilds of Mysore, no less than in the plains of the Deckan, those lessons of warfare which enabled him to end the ambitious career of the subjugator of Europe, who once thought to make an ally of Mysore and to conquer the East. Waterloo may in one sense have been won in the playing fields of Eton, but it was Mysore that contributed to develop the genius of the commander who carried the day, decried though he had been as the Sepoy General.

One cannot but be struck, in going over the modern history of Mysore, with the magnanimity of the British to this country, and equally with the manner in which the country has responded to the good influences exerted upon it. That it may continue to prosper must be the wish of all.

As in the former edition, so in this, I hold myself solely responsible for all information it contains, though I have endeavoured throughout to indicate the authorities on which it is based. The work has been left by Government entirely in my hands. The published Administration Reports are now not annual but quinquennial, and the last issued is to 1891. I have had, therefore, to resort to various sources for later information. But the greatest drawback I have felt has been the want of a good general library of reference.

No one can be more conscious than the author of the shortcomings of a work embracing such a variety of subjects and extending over so great a range of time. I have striven to accomplish to the best of my ability the task entrusted to me, and can only bespeak for the present edition as indulgent and favourable a reception as was accorded to the original one.

BANGALORE, *Sept. 1897.*

PREFACE TO FIRST EDITION

ON the termination, in May 1799, of the last English war with Mysore, and the restoration of the Hindu Ráj, which followed, it was resolved by the East India Company to obtain a topographical survey and general statistical account of the Territories that, for many years preceding, had been the scene of political events which attracted a large measure of attention not only in India and the East, but also in England, France, and other European countries.

Dr. Francis Buchanan (who subsequently assumed the name of Hamilton) was accordingly deputed, in February 1800,¹ by the Governor-General, the Earl of Mornington, afterwards Marquis Wellesley, to travel through and report upon "the Dominions of the Rájá of Mysore, and the country acquired by the Company in the late war from the Sultan, as well as that part of Malabar which the Company annexed to their own Territories in the former war under Marquis Cornwallis." He set out on this journey from Madras on the 23rd April 1800, and completed it on the 6th July 1801. His report was written from day to day, while travelling, in the form of a Journal, which, on completion, was transmitted to England and placed in the library of the East India House. On the recommendation of the learned Dr. (afterwards Sir Charles) Wilkins, the Librarian, its publication was sanctioned at the end of 1805, but the manuscript went to press apparently without the knowledge of its author. "Soon afterwards," says Dr. Buchanan, in his introduction, "my duty having unexpectedly brought me to England, I was agreeably surprised to find that my Journal had obtained a reception so favourable. It is true I wished to have abridged the work before publication, and altered its arrangement; but as the printing had commenced before my arrival, and as my stay in England was likely to be very short, I could not undertake such alterations. I have therefore contented myself with revising the manuscript,

¹ Then already well known for his valuable botanical researches in Burma and Chittagong.

and the superintendency of the press has been entrusted to Mr. Stephen Jones."

The work appeared in 1807, in three quarto volumes, under the title of *A Journey from Madras through the Countries of Mysore, Canara and Malabar*. Every page teems with valuable information, but the disjointed style, inseparable from the nature of a daily journal, makes it difficult to consult, and it is much to be regretted that the accomplished author had not the opportunity of throwing the work into a more suitable form for publication. It was reprinted, in two volumes octavo, at Madras in 1870.

While Dr. Buchanan was engaged in these travels, Colonel Colin Mackenzie—eventually Surveyor-General of India, and well known to Orientalists for his antiquarian collections in Southern India¹—was commissioned by the Governor-General to make a Survey of Mysore. He was allowed only three assistants, with a medical officer as surgeon and naturalist. In spite of many obstacles, however, the survey was continued till 1807. The result was not alone a valuable contribution to geographical knowledge, but considerable materials were acquired of the statistics and history of the country. These were recorded in folio volumes transmitted to the East India Company. Copies of eight volumes, attested by Colonel Mackenzie's signature, are deposited among the records of the Mysore Residency. The most novel and important of the discoveries made by him was that of the existence of the sect of Jains in India, which he was the first to bring to notice.

The first surgeon and naturalist attached to the Mysore Survey was Dr. Benjamin Heyne, whose papers on a variety of subjects relating to this and the neighbouring countries were published in London in 1814 (also by the recommendation of Dr. Wilkins, Librarian at the East India House) under the title of *Tracts, Historical and Statistical, on India*. Subsequently, the gifted Dr. John Leyden² was attached to

¹ Including, according to the catalogue by Prof. H. H. Wilson, 1,568 manuscripts of literary works, 2,070 local tracts, 8,076 copies of inscriptions, 2,150 translations, 2,709 plans and drawings, 6,218 coins, and 146 images and antiquities.

² "He rose," as Sir John Malcolm, Resident of Mysore describes, "by the power of native genius, from the humblest origin to a very distinguished rank in the literary world. His studies included almost every branch of human science, and he was alike ardent in the pursuit of all. The greatest power of his mind was perhaps shown in his acquisition of modern and ancient languages. . . ."

His end was most sad. On the conquest of Java in 1811, he accompanied the Governor-General, Lord Minto, to that island, and hearing at Batavia of a library containing a valuable collection of Oriental manuscripts, hastened to explore it. The long low room, an old depository of effects belonging to the Dutch Government, had been shut up for some time, and the confined air was strongly impregnated with the poisonous quality which has made Batavia the grave of so many Europeans. With-

the Survey in the same capacity, but beyond a few anecdotes and verses in his *Poetical Remains*, published in London in 1819, I have failed to meet with anything of his specially about this Province, though it is stated that "he drew up some useful papers, which he communicated to the Government, relative to the mountainous strata and their mineral indications; as to the diseases, medicines and remedies of the natives of Mysore, and the peculiarities of their habits and constitution by which they might be exposed to disease; as to the different crops cultivated in Mysore and their rotation; and to the languages of Mysore, and their respective relations." Heyne's observations were confined to the north and east; Leyden's papers, if traced, would give us information regarding the south and west.

Colonel Mark Wilks, distinguished as the historian of Mysore, at which Court he was for a time Resident, published his well-known work under the title of *Historical Sketches of the South of India*, in three volumes quarto; the first of which appeared in London in 1810, and the two last not till 1817, owing to his appointment during the interval as Governor of St. Helena, which office he held until the imprisonment on that island of the emperor Napoleon Buonaparte. "It displays," as an old reviewer justly observes, "a degree of research, acumen, vigour, and elegance, that render it a work of standard importance in English literature." A reprint, in two volumes octavo, was published in Madras in 1869.

Some monographs drawn up by officers of the Mysore Commission soon after the assumption of the Government by the British in 1831, with kindred papers, were printed in 1864 as *Selections from the Records*. In 1855 a *General Memorandum* was prepared by Sir Mark Cubbon for the Marquis Dalhousie, and since that time *Administration Reports* have been regularly issued every year.

out the precaution of having it aired, he rushed eagerly in to examine its treasures, was seized in consequence with a mortal fever, and died on the 28th August, after three days' illness, in the 36th year of his age.

Southey wished "that Java had remained in the hands of the enemy, so Leyden were alive," while Sir Walter Scott paid the following tribute to his memory in the *Lord of the Isles*:—

His bright and brief career is o'er,
And mute his tuneful strains;
Quenched is his lamp of varied lore,
That loved the light of song to pour;
A distant and a deadly shore
Has Leyden's cold remains.

The centenary of Leyden's birth was celebrated with public rejoicings in 1875 at his native village of Denholm, on the banks of the Teviot, in Scotland.

Other sources of information exist,¹ for a good deal has been written in connection with Mysore during a century back, much of it partisan ; but the above were some of the chief public and authentic materials accessible for a work which had become a desideratum, namely, a Gazetteer of Mysore brought up to date, presenting in a handy form and within a moderate compass all that was of interest in relation to the natural features, resources and productions of the country ; its history, population, industry, administration, and any other subjects that had a claim to be treated of in such a handbook.

The first step taken towards supplying the want was in June 1867, when a circular was addressed by Mr. Saunders, C.B., the officiating Chief Commissioner, to the Superintendents of Divisions, directing the compilation, for each District, of a Gazetteer similar to one then lately published of the Bhandara District in the Central Provinces. In pursuance of these orders, during the next two years, nine manuscript volumes were prepared. Only two, however, came to be printed ; namely, one for Mysore District, by Mr. H. Wellesley ; and one for Kolar, I presume by Mr. Krishnaiengar, C.S.I. Of the remainder, those for Bangalore and Kadur were not completed ; the one for Shimoga bears the signature of Captain Gordon Cumming ; that for Hassan of Major W. Hill ; that for Tumkūr of Major C. Pearse ; and that for Chitaldroog of Mr. Krishna Rao. The subsequent *Reports on the Census* of November 1871, by Major Lindsay, naturally superseded most of the statistical information contained in them.

The design to appoint an editor who should bring out one work on a uniform plan was next adopted, and eventually, in 1873, with the sanction of the Government of India, it was proposed to me to undertake the compilation of the *Gazetteer of Mysore and Coorg*. A personal acquaintance more or less with every part of the two countries, gained in the course of official duty ; a familiarity with the local vernaculars ; and some measure of information regarding the literature and ancient history of this part of India, derived from antiquarian studies ; led me to anticipate the work with interest. But being, at almost the same time, raised to the head of the Educational Department, I found that the labours of a new office which is no sinecure, left little leisure for the extra duty imposed upon me. I was therefore forced to be content for some time with making tours to such parts of the country as I had not recently visited, and collecting information from various quarters.

¹ I would particularly mention *Eastern Experiences*, by Mr. L. Bowring, C.S.I., late Chief Commissioner, published in London in 1871.

² A paragraph relating to Coorg is here omitted.

However, when in 1874 Dr. Hunter, Director-General of Statistics, who is charged with the editorship of the Imperial Gazetteer for the whole of India, visited Bangalore, I was able to lay before him the plans I had formed for the work, and at his request undertook to prepare for Mysore a manual of each District, separately, which I had not at first intended, as it seemed to involve a certain degree of repetition. I am now glad that I did so, as it obliged me to go more minutely into several subjects. Dr. Hunter again paid a visit to Bangalore in January 1876, when a part of the work had been printed, and in his report to Government was pleased to express the strongest approval of what had been done, and his "sense of the high value of the materials that had been supplied."

The Gazetteer has thus finally taken the shape of two volumes devoted to Mysore (and a third to Coorg). Of the former, the first treats of Mysore in general, the second of Mysore by Districts, eight in number. A reference to the table of contents, prefixed to each volume will enable the reader to see at a glance the arrangement and distribution of subjects. Volume II, it should be stated, was printed first. In general the present work has been brought down to 1875, but in the portions printed after that, a few statistics of later date have been admitted. I had thought to append a short biographical notice of some of the remarkable men, both Native and European, who have been connected with Mysore, but feared it would extend the work too much, and perhaps be considered foreign to its design. The subject, however, is one full of interest.

I will not deny that the Gazetteer has caused far more labour than I had anticipated, principally owing to the demands of an extensive Department, which prevented my ever giving undivided attention to the compiling of it. But these are conditions under which much of the best work in India has been accomplished, and I gratefully acknowledge the indulgence which has been extended by Government to any apparent, but unavoidable, delay in bringing the task to completion.

With regard to all such information and statements contained in these volumes as I am not personally responsible for, I have endeavoured to make a point of mentioning throughout the body of the work the authorities on which they are based; and my sincere and hearty thanks are tendered to all who have favoured me with any information or assistance, as well as to the Press. I may add that the proofs have been seen, on the part of Government, by Major Tredway Clarke, Officiating Secretary to the Chief Commissioner.

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MYSORE

PHYSICAL GEOGRAPHY

THE State of Mysore¹ occupies a position physically well defined, in the South of India ; and has been termed a rocky triangle, a not inapt description. It is a table-land, situated in the angle where the Eastern and Western Ghat ranges converge into the group of the Nilgiri Hills. West, south and east, therefore, it is enclosed by chains of mountains, on whose shoulders the plateau which constitutes the country rests. On the west the boundary approaches at one part to within 10 miles of the sea, but in general preserves a distance of from 30 to 50 miles from the coast : on the east the nearest point is not less than 120 miles. The southern extremity is 250 miles from Cape Comorin. The northern frontier is an exceedingly irregular line, ranging from 100 miles south of the river Krishna on the west to 150 on the east.

The country extends between the parallels of $11^{\circ} 38'$ and $15^{\circ} 2'$ north latitude, and between the meridians of $74^{\circ} 42'$ and $78^{\circ} 36'$ east longitude, embracing an area of 29,305 square miles, as determined by the Surveyor-General of India from the recent survey on the one-inch scale. (It is therefore nearly equal to Scotland, whose area is 29,785 square miles.) The greatest length north and south is about 230 miles, east and west about 290.

¹ The name is that of the capital, properly *Maisûr*, for *Mahishûr*,—from *mahisha*, Sans. for buffalo, reduced in Kan. to *maisâ*, and *ûru*, Kan. for town or country,—which commemorates the destruction of Mahishâsura, a minotaur or buffalo-headed monster, by Châmundi or Mahishâsura-mardani, the form under which the consort of Siva is worshipped as the tutelary goddess of the Mysore royal family.

Except in a passage in the Mahawanso, where it is called Mahisha-mandala, the designation of the country throughout Hindu literature is Karnâta or Karnâtaka (for derivation see chapter on Language), which properly applied to the country above the Ghats. But the Muhammadans included in the name their conquests below the Ghats as well, and the English, going a step further, erroneously restricted it to the low country. Hence Carnatic and Canara now designate, in European works of geography, regions which never bore those names ; while Mysore, the proper Karnâtaka or Carnatic, is not so called.

It is surrounded by the Madras Presidency on all sides, except on part of the west, where the Bombay Presidency northwards and Coorg southwards form the boundaries. The Madras Districts bordering on it are Bellary and Anantapur on the north; Kadapa, North Arcot and Salem on the east; Coimbatore, Nilgiris and Malabar on the south; South Canara on the west. The Bombay Districts of Dharwar on the north and North Canara on the west complete the circle. Coorg intervenes between the adjacent parts of South Canara and Malabar on the south-west.

The general elevation rises from about 2,000 feet above the sea level along the northern and southern frontiers to about 3,000 feet along the central water-parting, which separates the basin of the Krishna from that of the Kávéri and divides the country into two nearly equal parts. But the surface is far from preserving the even character suggested by the designation of table-land. For the face of the country is everywhere undulating, much broken up by lines of rocky hills or lofty mountains, and scored in all parts by *ndlas* or deep ravines. There is probably not a square mile in the whole superficies absolutely flat or level, the slope of the ground ranging from 10 to 20 feet per mile in the more level portions, and as high as 60 and 80 feet elsewhere.

The country is longitudinally intersected by single or aggregated chains of hills, running chiefly north and south, or in a direction nearly parallel to the two coasts. They lie at uncertain and unequal distances from each other, and accordingly form sometimes wide and sometimes narrow valleys. Isolated peaks of massy rock, termed by Europeans *droogs*,¹ rearing their heads to 4,000 or 5,000 feet above the level of the sea, stand forth like sentinels on every hand; mostly crowned with the remains of fortifications, whose position, with the advantage of an unfailling supply of water at the summit, rendered them wellnigh impregnable strongholds. Besides these, clusters or piles of naked rocks, composed of immense rounded boulders, are frequent; large fragments being often delicately poised, like logging stones, upon some projecting point; appearing as if a touch would overturn them, and yet sometimes supporting a shrine or *mandapa*.

Natural divisions.—Mysore naturally divides itself into two separate regions, each of which has well-marked and distinctive features.

Of these the Malnád,² or hill country, lies to the west, and is confined to the tracts bordering or resting on the Western Ghats. It is a land of magnificent hill and forest, presenting alternations of the most diversified

¹ Properly *dur-ga*, a Sanskrit word meaning *difficult of access*, and denoting hill-fort.

² Kan. *Male*, hill; *nddu*, district, region.

and charming scenery. A fertile soil and perennial streams clothe the valleys with verdant cultivation. The sheltered hillsides are beautiful with waving woods, which give shade to numerous plantations of coffee. Higher up are swelling downs and grassy slopes, dotted over with park-like groups of trees. Above all, the gigantic mountains rear their towering crests in every fantastic form of peak. Human dwellings are few and far between. A cottage here and there, picturesquely situated on the rising ground bordering the rice-fields, and hidden amid plantations of areca palm and plantain, marks the homestead of a farmer and his family. Towns there are none, and villages of even a dozen houses rare. The incessant rain of the monsoon months confines the people to their own farms. Hence each householder surrounds himself with all he needs, and succeeds in making himself to a great extent independent of the external world. The conditions of this isolated life are insupportable to immigrants from the plains.

But by far the greater portion of the Province, or all to the east and north of a line from (say) Shikarpur to Periyapatna, continued along the southern border to the Biligirirangan hills, belongs to the division of Maidán, *Bail shíme*, or open country. Although much of the intermediate region partakes of the characteristics of both, the transition from the Malnád to the Maidán is in some places very marked. Dense forests, which shut in the view on every hand, give place to wide-spreading plains: the solitary farm to clustering villages and populous towns. Man meets with man, the roads are covered with traffic, and the mind feels relief in the sympathy of numbers.

The means of water-supply and the prevailing cultivation give the character to the various parts of the open country. The level plains of alluvial black soil, as in the north, growing cotton or millet; the districts irrigated by channels drawn from rivers, as in the south and west, displaying the bright hues of sugar-cane and rice-fields; the lands under tanks, filled with gardens of cocoa and areca palms; the higher-lying undulating tracts of red soil, as in the east, yielding ragi and the common associated crops; the stony and wide-spreading pasture grounds, as in the central parts, covered with coarse grass and relieved by shady groves of trees. The aspect changes with the seasons, and what in the dry and cold months, when the fields are lying fallow, appears a dreary and monotonous prospect, speedily assumes under the first operations of the plough the grateful hues of tillage; which, under the influence of seasonable rains, give place in succession to the bright verdure of the tender blade, the universal green of the growing crops, and the browner tints of the ripening grain. The scene meanwhile is full of life, with husbandmen, their families and cattle engaged in the

labours of the field. These are prolonged in stacking and thrashing until the cold season again sets in and the country once more assumes a parched and dusty aspect.

River systems.—The drainage of the country, with a slight exception, finds its way to the Bay of Bengal, and is divisible into three great river systems; that of the Krishna on the north, the Kávéri on the south, the two Pennárs, and the Pálár on the east. The only streams flowing to the Arabian Sea are those of certain taluqs in the north-west, which, uniting in the Sharavati, hurl themselves down the Ghats in the magnificent falls of Gersoppa; and some minor streams of Nagar and Manjarabad, which flow into the Gargita and the Netravati.¹

A line drawn east from Ballálráyan-durga to Nandidurga (Nundydroog) and thence south to Anekal, with one from Devaráydurga north to Pavugada, will indicate approximately the watershed separating the three main river-basins. From the north of this ridge flow the Tunga and the Bhadra, rising in the Western Ghats and uniting in the Tungabhadra, which, with its tributary the Hagari or Vedavati, joins the Krishna beyond the limits of Mysore in Srisaila near Karnul. From the south of the line, the Hemavati (with its affluent the Yagachi), the Lokapávani, Shimsha, and Arkavati flow into the Kávéri, which, rising in Coorg and taking a south-easterly course through the country, receives also on the right bank the Lakshmantirtha, the Gundal, the Kabbani and the Honnu Hole before quitting the territory. From the east of the line, in the immediate neighbourhood of Nandidurga, spring three main streams, forming a system which Lassen has designated “die Tripotamie des Dekhans,” namely, the Uttara Pinákini or Northern Pennár (with its tributaries the Chitravati and Pápaghni), which discharges into the sea at Nellore; the Dakshina Pinákini or Southern Pennár,² which ends its course at Cuddalore; and between them the Pálár, whose mouth is at Sadras. A continuation of the east and west line through Nandidurga to Sunṅakal will mark the water-parting between the first and the other two; which, again, are divided by a line passing from Jangamkote to Bowringpet and the Betaráyan hills.

More accurately described, the axial line or “great divide” which forms as it were the backbone of the country, starts from the north of Ballálráyandurga and runs east-by-north to near Aldur. Thence it makes a bend, first, northwards up to the western extremity of the Baba

¹ The course of each river is described in detail in Vol. II.

² Its name below the Ghats appears to be *Poni-dr* or *Ponn-dr*, golden river, *dr* being the Tamil for river. It would be very convenient were geographers to agree upon restricting the name Penna to the northern stream and that of Ponna to the southern. The former is also called Pennér (written Pennair), *er* being the Telugu for river.

Budañ range and then south-east, passing between Belur and Halebid, down to Sige Gudda in the north of the Hassan taluk. From this point it strikes across the map in an east-north-east direction, rounding the southern extremities of the Harnhalli and Hagalvadi hills, up to near Kortagiri, where it encounters the great meridional chain of mountains. Following the range south, past Devaráyidurga to near Dodbele, it resumes an east-north-easterly course to Nandidurga and continues the same to the frontier near Sunnakal. Geographically it lies between the parallels of 13° 10' and 13° 25'.

A line projected north from the west of Kortagiri up through Pavugada to the frontier, and one south from Nandidurga by Bangalore to Anekal, mark pretty nearly the limits of the respective river-basins in the transverse direction. This water-parting falls between the meridians of 77° 10' and 77° 30'.

The basin of the Sharavati, which runs to Honávar on the Canara coast, occupies the west of the Shimoga District. It may be defined by a line drawn from Kodachádri south-east to Kavaledurga, thence north-east by Humcha to Masarur, and west-north-west by Anantapur and Ikkeri to Talguppa. The streams between Kodachádri, Kavaledurga and the Agumbi ghat westwards, run down to Kondapur; and those of western Manjarabad, to Mangalore.

The following statement contains an estimate of the total length, within the Province, of the main rivers with their principal tributaries; and the total area of the catchment basin under each river-system within the same limits :—

River System	Total Length of Rivers	Total Area of Basins
	Miles.	Square Miles.
Krishna	611	11,031
Kávéri	646	9,486
N. Pennár	167	2,280
S. Pennár	32	1,541
Pálár	47	1,036
Sharavati and west coast rivers	103	1,881

Owing to either rocky or shallow beds, none of the Mysore rivers is navigable,¹ but timber floats are carried down the Tunga, the Bhadra,

¹ From the following statement in Buchanan it appears that Haidar attempted to establish navigation on the Tunga. "From Mangalore Haidar brought to Shimoga many carpenters, and built a number of lighters of about eight tons burthen. They are strong and flat-bottomed; but, as the greater part of them have been allowed to remain on the bank where they were built, I doubt not that they were found very useless. The attempt is, however, no impeachment on the sagacity of Haidar, who

and the Kabbani at certain seasons. Most of the streams are fordable during the dry months, or can be crossed by rude bridges formed of logs or stones thrown across from boulder to boulder. During floods, and when freshes come down, traffic over the streams is often suspended until the water subsides. But throughout the rainy season they are generally crossed at the appointed ferries by rafts, basket boats, canoes, or ferry boats. Men also sometimes get over supporting themselves on earthen pots.

The *teppa* or raft is formed of bamboos lashed together, and merely affords an unsteady footing, the water washing freely through. The *harigólu* or coracle is a circular basket of stout wicker-work, composed of interlaced bamboo laths and covered with buffalo hides. It is 8 or 10 feet in diameter, with sides 3 or 4 feet high.¹ A smaller one, which holds only two people, is used for crossing some jungle streams. The *dóni* or canoe is a dug-out, or hollowed log pointed at the two ends. The *sángda*, or regular ferry boat,² is formed of two canoes secured together, with a platform or deck fastened upon them, and has sides turning on hinges which, let down, form a gangway for loading and unloading. All these craft are propelled by a long bamboo pole, and are dependent for their course upon the currents. But paddles are sometimes used with the canoe.

Though useless for purposes of navigation, the main streams, especially the Kávéri and its tributaries, support an extensive system of irrigation by means of channels drawn from immense dams, called anicuts,³ which retain the upper waters at a high level and permit only the overflow to pass down stream. These works are of great antiquity,

having been educated in a place remote from every kind of navigation, could have no idea of what boats could perform, nor of what obstacles would prevent their utility. To attempt dragging anything up such a torrent as the Tunga would be vain; but, after having seen the boats, and known that some of them have been actually navigated down the river, I have no doubt of its being practicable to carry down floats; and on these perhaps many bulky articles of commerce might be transported."

¹ Herodotus notices, as one of the most remarkable things he had seen at Babylon, boats of a construction so exactly similar, that the description of one would precisely answer for the other, with the single difference of substituting willow for bamboo. These boats carried the produce of Armenia, and "the parts above Assyria," down the Euphrates to Babylon; and each boat along with its cargo carried a few asses for the purpose of conveying the returns by a shorter overland route. Boats of the description noticed by Herodotus, although apparently unknown in Greece at that period, were in after ages commonly used in Italy on the Po; and in Britain in the time of Caesar. Boats of the same materials but of different shape are used at this time in South Wales, and the north-west of Ireland; in the former country they are named *coracle*, in the latter *corraigh*.—WILKS, i, 257.

² The mention of *σάγγα* occurs in the Periplus.

³ From Kan. *ane kätte*, both meaning dam, dyke, or embankment.

the large Talkad anicut, the lowest down on the Kávéri, having been constructed a thousand years ago; while the most recent, with few exceptions, are not less than three centuries old. "The dreams which revealed to favoured mortals the plans of these ingenious works (says Wilks) have each their appropriate legend, which is related with reverence and received with implicit belief." The channels or *kálvés* thence drawn, meander over the adjoining tracts of country on either bank, following all the sinuosities of the ground, the total length running being upwards of 1,200 miles.¹

There are no natural lakes in Mysore, but the streams which gather from the hillsides and fertilize the valleys are, at every favourable point, embanked in such a manner as to form series or chains of reservoirs, called tanks,² the outflow from one at a higher level supplying the next lower, and so on all down the course of the stream at a few miles apart. These tanks, varying in size from small ponds to extensive lakes, are dispersed throughout the country to the number of 38,080; and to such an extent has this principle of storing water been followed that it would now require some ingenuity to discover a site suitable for a new one without interfering with the supply of those already in existence. The largest of these tanks is the Súlekere, 40 miles in circumference. Other large ones are the Ayyankere, Madaga-kere, Masur-Madaga-kere, Vyása samudra, Rámaságara, Moti Taláb, &c., of which accounts will be found elsewhere (Vol. II).

The spring-heads called *talpargis* form an important feature of the hydrography of the north-east. They extend throughout the border regions situated east of a line drawn from Kortagiri to Hiriyur and Molkalmuru. In the southern parts of this tract the springs may be tapped in the sandy soils at short distances apart, and the water rises close to the surface. Northward the supply is not so plentiful. In Pavugada a soft porous rock has to be cut through before reaching the water, and in the other taluqs of the Chitaldroog District hard strata of rock have sometimes to be perforated. When the water is obtained, it is either conducted by narrow channels to the fields, or a *kapile* well is constructed, from which the water is raised by bullocks.

Mountain systems.—From the gigantic head and shoulders, as it were, of the lofty Nilgiri group, which commands the southern frontier, are stretched forth like two arms, in a north-west and north-east direction respectively, the Western and Eastern Ghat ranges, holding within

¹ The anicuts and channels are fully described under the respective rivers in Vol. II.

² *Kere* is the general name in Kannada, but *koḷa*, *kunte*, and other terms are applied to certain descriptions.

their mighty embrace the mountain-locked plateau of Mysore.* The hills of this table-land, though rarely in continuously connected chains, arrange themselves into systems crossing the country longitudinally, in directions more or less parallel with the Eastern and Western Ghats according to their proximity to one or the other; and attaining their greatest elevation between 13 and $13\frac{1}{2}$ degrees of north latitude, along the north of the watershed line dividing the Krishna and Kávéri river systems.

The best defined of these ranges is a belt, from 10 to 20 miles wide, running between the meridians of 77 and $77\frac{1}{2}$, from the Biligirirangan hills as their western limit, through Kankanhalli northwards up to Madgiri, and on to the frontier by way of Pavugada and Nidugal. It separates the eastern from the northern and southern river-basins. On the west, a somewhat corresponding range, not more than 10 miles in width, runs north along the meridian of $75\frac{1}{2}$ from Balláráyan-durga up to beyond Shikarpur, having on its east the loop of the Baba Budans, projecting as it were like some Titanic bastion guarding the approaches to the Malnád or highland region formed by the congeries of hills and mountains which intervene between the range and the Ghats on the west.

Intermediate between the two internal ranges above described is placed a hilly belt or chain, with considerable intervals between its component parts, tending to the east on the south of the central watershed and to the west on the north of it, so as to form a very obtuse angle in traversing the centre of the country. Starting from the Wainad frontier at Gopalswami betta, between Gundlupet and Heggadadevankote, it passes by Seringapatam and Nagamangala to Chunchangiri, where, exchanging its easterly for a westerly course, it reappears to the west of Kibbanhalli in the Hagalvadi hills, and crossing in a continuous belt through the middle of the Chitaldroog District, quits the country to the north of Kankuppa.

In the northern section of the territory, where the distance between the Ghat ranges, and by consequence between the intermediate belts, continues to increase, the interval is occupied by minor ranges. Of these the most important is the Nandidroog range, commencing near the hill of that name and stretching northwards by Gudibanda to Penukonda and the Anantapur country. In the west, a similar medial chain, but of lower elevation, passes from the eastern base of the Baba Budans south of Sakrepatna, up by Ajimpur, the Ubrani hills and Basvapatna, between Honnali and Male Bennur, along the right bank of the Tungabhadra, to the frontier, where it meets that river.

Viewing the mountains as a whole, the Eastern and Western Ghat

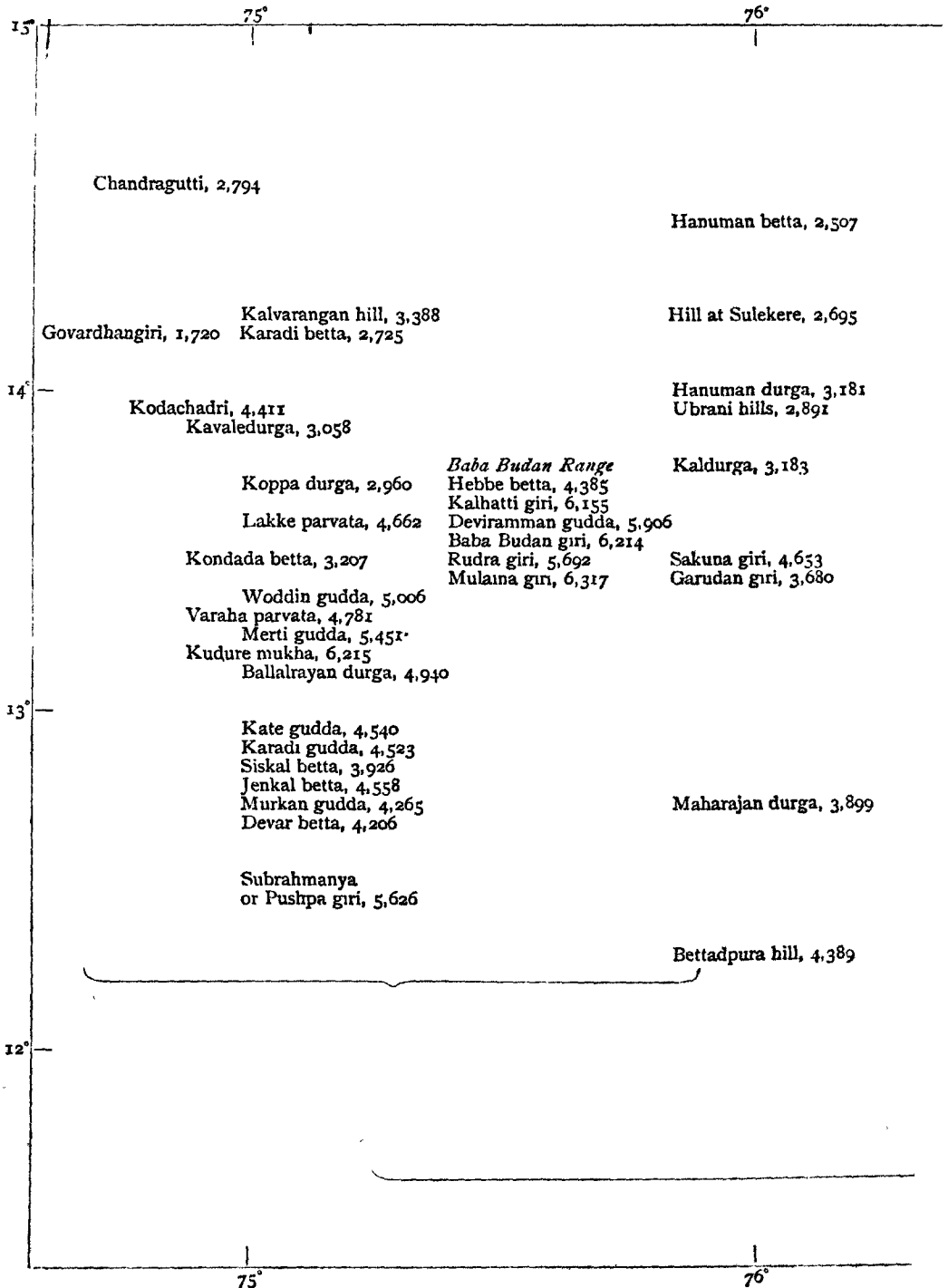
ranges might be compared to the antlers of a stag, the branching tynes being represented by the intermediate parallel chains starting from the north of the central watershed and more or less connected by cross ridges along their southern extremities. The chief peaks of the western system are loftier than those of the eastern. Except on the verge of the Western Ghats, all the mountains throughout the country, it is believed, present their steepest escarpment more or less eastwards. In the west, Mulainagiri, and in the east, Nandidroog, are the highest elevations, and they are almost on the same parallel, or between $13^{\circ} 23'$ and $13^{\circ} 24'$, immediately north of the central watershed. The loftiest points just south of that line are Balláráyan-durga in the west, and Sivaganga in the east, both situated between $13^{\circ} 8'$ and $13^{\circ} 10'$.

The table on the following page will serve to show the arrangement and altitude of the principal peaks in each system. The figures are mostly taken from the charts of the Great Trigonometrical Survey of India, supplemented from those of the Topographical Survey. Furnished at the summit with springs which yield an unfailing supply of water, most of these heights seem formed by nature for secure retreats. Hence there are few of the more prominent ones that have not been surrounded or capped with fortifications, often carried in long lines, with a vast expenditure of labour, along all the spurs and projections of the droog, forming strongholds with good reason deemed impregnable before the time when British artillery was directed against their walls. A particular account of the most interesting will be found under each District.

It may be useful to quote here the following most recently published opinion regarding the physical geography of this part of India:—"In the peninsular area the mountains are all remnants of large tablelands, out of which the valleys and low lands have been carved. The valleys, with a few local exceptions, are broad and open, the gradients of the rivers low, and the whole surface of the country presents the gently undulating aspect characteristic of an ancient land surface." "The Anamalai, Palni and Travancore hills, south of the Palghat gap, and the Shevaroy and many other hill groups scattered over the Carnatic, may be remnants of a table-land once united to the Mysore plateau, but separated from it and from each other by ancient marine denudation. Except the peculiar form of the hills, there is but little in favour of this view, but on the other hand there is nothing to indicate that the hill groups of the Carnatic and Travancore are areas of special elevation."¹

¹ R. D. Oldham, "Manual of the Geology of India," 2nd edition (1893), pp. 2, 4.

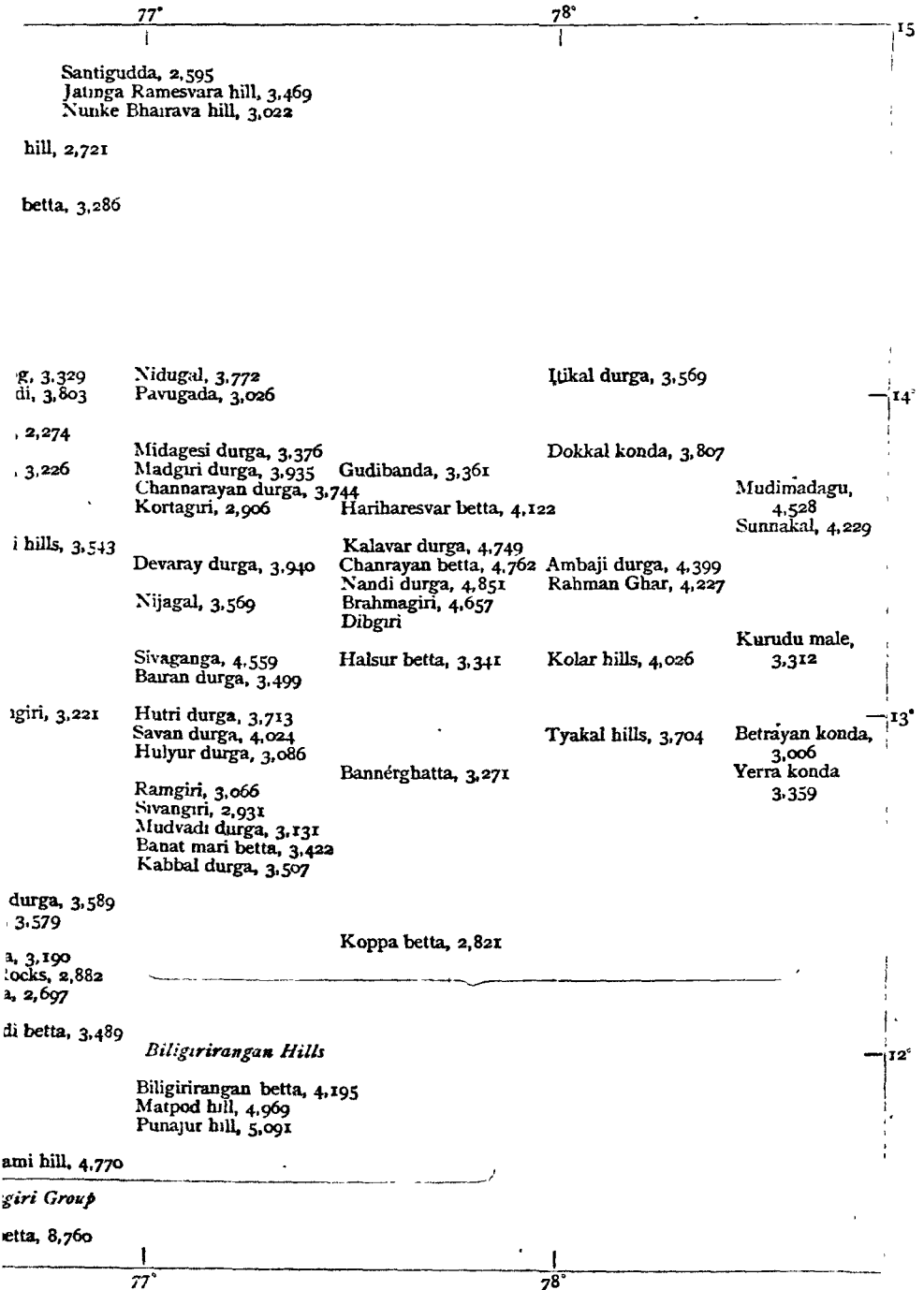
PHYSICAL GEOGRAPHY
WESTERN SYSTEM



MOUNTAIN SYSTEMS

Chain

EASTERN SYSTEM



GEOLOGY¹

The great ranges of the Western and Eastern Ghats, together with the intervening table-lands, may be regarded as part of one magnificent elevation of Plutonic rocks by a succession of efforts, during a period which may be termed Plutonic, breaking up the hypogene schists and in some instances uplifting aqueous beds of a more recent origin. The true general direction of this elevation is nearly N. 5° W, though the apparent directions of the lateral chains on its flanks are to the east and west of north respectively.

The surface of the table-lands between these chains has a general inclination easterly by south towards the Bay of Bengal, into which the principal rivers empty themselves. This gentle inclination, often assisted by cross lines of elevation, determines the great drainage lines of the country. The singular appearance of the detached hills and clusters of hills, which above the Ghats are seen abruptly starting up from the flat plains with little or no *tali*, have been sometimes compared to a table with teacups here and there reversed on its surface, a not inapt though homely illustration.

The bare extensive surfaces of the granitic, trappean and hypogene rocks in Southern India afford on a grand scale *exposés*, not to be surpassed in any other portion of the globe, of the protean aspects under which these rocks present themselves. The very absence of those fossiliferous beds which so thickly encrust the surface of a great portion of Europe and many other parts of the world, is in itself a subject of interesting research; and the geologist may in the peninsula of India advantageously study a huge and disjointed mass of the nether-formed

¹ Chiefly from articles by Captain Newbold, F.R.S., on the "Geology of Southern India."—(J. R. A. S. viii, ix, xii.)

[NOTE.—When compiling the first edition, I applied to the Geological Survey of India for information on the geology of Mysore, and was informed in reply that, as the country had not been surveyed, nothing was known of its geology. Being thus thrown on my own resources, I discovered the articles from which this chapter was taken. Their value has since been recognized by the Geological Survey, for Mr. W. T. Blanford, in the Introduction to the first edition of the "Manual of the Geology of India" (p. lxxii), writes as follows :—

Newbold, 1844-1850.—This account refers to the southern part of the Peninsula alone; but it is the work of one of the best, if not actually the best, of the earlier Indian geologists; and it has the peculiar advantage over all other summaries published up to the present time, that the author possessed an extensive personal acquaintance with the country described. . . . Most of the observations recorded in the summary are admirable; and altogether the paper is so valuable, that the neglect with which it has been generally treated is not easy to understand.]

rocks which constitute the framework of our planet, and which here present themselves almost divested of integument, weathering under the alternations of a vertical sun and the deluging rains of the tropics.

Metamorphic Rocks.—Hypogene schists, penetrated and broken up by prodigious outbursts of plutonic and trappean rocks, occupy by far the greater portion of the superficies of Southern India. They constitute the general bulk of the Western Ghats from between the latitude of 16° and 17° N. to Cape Comorin; and from the northern base of the Eastern Ghats to their deflection at latitude $13^{\circ} 20'$ N. They are partially capped and fringed in the Western Ghats by laterite, and in the Eastern Ghats by sandstone, limestone and laterite. They form the basis of the valley of Seringapatam and of the table-land of Mysore.

The inequalities and undulations of the surface, though originating in the dislocations and flexures of the metamorphic strata at the periods of their upheaval, have been evidently modified by aqueous erosion and by the faster weathering of the softer members of the series,—such as mica and talcose schists,—the softer clay slates and shales; which, crumbling and washed away, have left their harder brethren standing out in relief on the face of the country. Where we see gneiss, hornblende schist and quartzite rising in parallel ridges separated by valleys, we generally find the valleys occupied by the softer members of the series, often deeply covered with debris from the ridges.

Where gneiss rises above the general level of the surrounding plain, its elevations may be distinguished from those of granite, which the hills of thick-bedded varieties of gneiss sometimes assimilate, by their greater continuity and uniformity of altitude; their tendency to a smooth dome-shaped outline; and greater freedom from precipices and disrupted masses. Near lines of plutonic disturbance, however, these distinguishing marks are less perceptible.

Elevations of mica and talcose schists obtain, generally, a less altitude than those of hornblende or gneiss; and have a more round-backed and smoother contour on the whole. Yet the outline in detail is jagged, owing partly to these rocks weathering in larger, more angular or less concentric fragments, often leaving abrupt steps and small precipices. Hornblende and gneiss are seen rising, as in the Western Ghats and the Nilgiris, to the height of 8,000 feet above the sea's level. The former is recognized by its bold sharp ridges, often precipitous, but rarely presenting conical peaks.

Hills composed entirely of actinolite or chlorite schist are seldom

met with ; those of quartzite have long crest-like outlines, often running smoothly for some distance, but almost invariably breaking up into large, angular masses, sometimes cuboidal : the sides of the crests are usually precipitous. Hills of clay slate are distinguished by a smooth, wavy outline, separated by gently sloping valleys. Outliers or detached hills of this rock are usually mammiform. But, as before remarked, all these normal crystalline rocks, when near lines or foci of plutonic disturbance, frequently undergo great changes in physiognomical aspect ; and in lieu of the smoothly rounded hills of clay slate, and its gently sloping vales, smiling with fertility, we behold it cleaved into sterile, rugged ravines and rocky precipices.

Gneiss is usually found lowest in the series : next to it mica and hornblende schist, actinolite, chlorite, talcose and argillaceous schist, and crystalline limestone, in due succession : but to this rule there are numerous exceptions. All these rocks, except crystalline limestone, have been observed resting on granite without the usually intervening gneiss. The strata are often violently contorted or bent in waving flexures, particularly in the vicinity of plutonic rocks ; and much irregularity occurs in the amount and direction of dip throughout the hypogene area. In the Western Ghats it is usually easterly, and at angles varying from 10° to 90° . At the summit of the Ghats near the falls of Gersoppa, the gneiss dipped at an angle of 35° to the N.E.

But the hornblende schists do not always dip from the plutonic rocks—in many instances the dip is towards them : a fact indicating that the strata have been disturbed at some previous period, or that they may have suffered inversion ; which is known to be the case in beds of more recent origin. While the dip of the two great lines of elevation, viz., the East and West Ghats, is generally westerly and easterly, or at right angles with the direction of the strata, that of the minor cross ranges is usually southerly. Numerous irregularities and exceptions, however, to this general rule occur, particularly near the northerly and southerly great synclinal line of dip on the table-lands between the Eastern and Western Ghats, and near localities where it is traversed by the cross lines of elevation. The intrusion of trap dykes has also caused much diversity in the dip. These irregularities will always prove obstacles in tracing out with accuracy the synclinal dip line between the Eastern and Western Ghats.

Gneiss and hornblende schist are by far the most prevalent rocks of the series : to gneiss the other members may be termed subordinate. Near its contact with the granite it commonly assumes the character of what has been styled granitoidal gneiss, losing its stratified appearance, and not to be distinguished in hand specimens from granite. Spherical

and oval masses of granite, resembling boulders, are sometimes observed impacted in the gneiss. Veins of reddish compact felspar, felspar coloured green with actinolite, epidote or chlorite, with and without quartz; also of milky quartz with nests of iron ore, mica and hornblende are very common in gneiss: also dykes and veins of granite. All these veins are of older date than the intrusion of the greenstone dykes which invariably sever them. Particular varieties of gneiss prevail in different districts. These rocks not only abound in nests and veins of rich magnetic and oxidulated iron ore, but in thick interstratified beds and mountain masses of these minerals.

Mica schist is found sparingly distributed over the whole of the hypogene area in thin beds. It is found in the greatest abundance and purity in the western parts of Mysore. A vein of granite in it is rare, though abounding in those of quartz. *Talcose, chloritic, and actinolitic schists* are still more sparingly distributed: the first is seen in the west of Mysore. Fine varieties of actinolitic schist occur in the Western Ghats at the falls of Gersoppa; and it is pretty generally distributed in thin beds over Mysore. *Hornblende schist* ranks next to gneiss in extent and thickness of beds, and is seen washed by the sea at the bases of the Eastern and Western Ghats, forming some of the loftiest peaks of the latter and supporting large level tracts of table-land. This rock varies from the compact structure of basalt to the crystalline texture of granite, and to that of porphyry, and may be seen from laminæ of a few lines in thickness, passing into beds forming mountain masses. The principal constituent minerals are hornblende and felspar. Quartz, garnet and mica are frequently mixed. Large beds of *compact felspar*, generally of a pinkish hue, with a little quartz and a few scales of mica, quartzite and milk quartz, having a similar direction to that of gneiss, occur, forming low ranges of hills. *Clay slate* does not occupy a large surface of the hypogene area. It occurs at Chiknayakanhalli, Chitaldroog, and in parts of the Shimoga District.

Imbedded Minerals.—Chert is pretty generally distributed, also the common garnet; the latter occurs in the greatest abundance in the Eastern Ghats, but is also found in the Kempukal river at the Manjara-bad Ghat; black garnet and tremolite occur in the granitoidal gneiss of Wurralkonda (Kolar District). Epidote and actinolite are found usually in quartz and felspar veins. Indianite occurs sparingly with corundum, fibrolite and garnet in gneiss and hornblende schist in the valley of the Kaveri. Corundum is found in Mysore in talc, mica, or hornblende schist associated with iron ore, asbestos, and sometimes indianite and fibrolite. It occurs imbedded in the rock in grains and crystals. Its principal localities are Gollarhalli near Chanraypatna,

Mandya near Seringapatam, Begur, Bannerghatta, Bagepalli and other places.¹ Fibrolite occurs but rarely with indianite and corundum. Kyanite occurs in gneiss with tremolite, pearl spar, bitter spar, almandine and staurolite. Steatite occurs in the talcose schists in the west of Mysore; as also potstone, in beds of considerable size and veins, and more or less dispersed over the whole hypogene area; occasionally associated with nephrite. Magnesite, an almost pure carbonate of magnesia, occurs in the vicinity of Hunsur. Mica is found universally diffused. In some parts of the Western Ghats and on the table-lands to the east, this mineral and talc are found in plates large enough for windows and lanterns, for which purpose they are used by the natives, as also for ornamental devices and for painting on. Chlorite is rarely found uncombined with felspar, siliceous, or hornblende. Nacrite or scaly talc is here and there met with. Adularia is found in the gneiss at some places. Albite or cleavelandite occurs occasionally throughout the gneiss districts, as also tourmaline or schorl, both black and green. Sulphate and sub-sulphate of alumina are occasionally found in thin incrustations and efflorescences between the layers of the soft ferruginous slates into which the hornblende and mica schists pass.

Iron pyrites or sulphuret of iron is distributed in small proportions in the hypogene rocks; but the oxides, both magnetic and hæmatitic, exist in extraordinary abundance, forming masses and large interstratified beds in the mountain chains. In gneiss these ores frequently replace hornblende and mica; alternating with quartz in regular layers. Magnetic iron ore with polarity is found in the massive state on the Baba Budan hills. Micaceous and specular iron ores are less common. A dark magnetic iron sand is usually found in the beds of streams having their origin among hypogene rocks, associated with gold dust and sometimes with menaccanite. Iron ore slightly titaniferous is found over the whole hypogene area. The black oxide of manganese associated with iron ore is found sparingly in the hills. Antimony occurs in the Baba Budan hills, and at Chitaldroog.

¹ Attention having been drawn to corundum as a valuable article of export, and on account of its possible use for the manufacture of aluminium, Mr. Petrie Hay, of Hunsur, has recently collected a quantity from villages to the south and west of that town. Very excellent crystals of yellowish corundum, with a brown weathered surface, were collected from the fields. Some tapering hexagonal prisms up to five inches in length, and a cubical piece of about four inches side, with a block weighing 300 lbs., were sent by him to the Madras Museum. Dr. Warth, of the Geological Survey, considers them of great importance as indicating the probability of a large and continuous yield. The quality of the quarried pieces is very little inferior to that of the crystals. The specific gravity of the large crystals was 4.02 and of the rock corundum 3.80.

Ores² of silver have been said to occur in Belli Betta near Attikuppa.¹ Ainslie states that Captain Arthur discovered this metal in small quantities in Mysore, both in its native state in thin plates adhering to some specimens of gold crystallized in minute cubes, and mineralized with sulphur, iron and earthy matter, forming a kind of brittle sulphuretted silver ore.

Gold has long been found in the alluvial soil bordering on the Betaráyan hills in Kolar District. The geognostic position of gold in this and other localities appears to be in the primary schists, viz., gneiss, mica slate, clay slate, and hornblende schist, particularly near the line of their contact with granite or basaltic dykes, where we generally find the tendency to siliceous and metallic development unusually great. The gold is almost invariably discovered either in thin veins or disseminated in grains in the veins and beds of quartz, associated with iron ore and sometimes platinum, and alloyed with small proportions of silver and copper, or in the tracts of alluvial soil, beds of clay and sands, with the washings of primary rocks. Mining operations were carried on here by the natives from a remote period and abandoned. But since 1875 gold mining has been revived on a large scale by European enterprise, and what was virtually a desert waste has thus been converted into a populous and thriving industrial centre. The details of these operations will be found farther on under Industrial Arts.

Plutonic Rocks.—*Granite* prevails throughout the great hypogene tracts, sometimes rising abruptly from the surface of immense level plains in precipitous peaked and dome-shaped masses; sometimes in low steppes; sometimes in great heaps of amorphous masses; at others with sharp outlines, obscured and softened down by a mantle of the hypogene schists which have accompanied its elevation. This latter occurs most frequently in continuous mountain chains, such as the Ghats; but to view this rock in all the boldness of its true physical contour, we must approach the detached ranges, clusters, and insulated masses that break the monotony of the table-lands. Here we find but little regularity in the direction of elevation. In many clusters the granite appears to have burst through the crystalline schists in lines irregularly radiating from a centre, or in rings resembling the denticulated periphery of a crater.

The most remarkable of the insulated clusters and masses of granite on the table-land of Mysore are those of Sivaganga, Sávandroog,

¹ But Mr. Bruce Foote, of the Geological Survey, reported in 1887 as follows:—
“I searched the hill most carefully and could not find the slightest trace of any ore of silver.”

Hutridroog, Nandidroog, Chandragutti, and Chitaldroog. The rock of Nandidroog is almost one solid monolithic mass of granite, rising 1,800 feet above the plain and upwards of 4,800 feet above the sea; that of Sivaganga is nearly as high. These masses have usually one or more of their sides precipitous, or at such an angle as to be inaccessible except at few points. Most of them, like that of Sávandroog, are so steep as to admit of little vegetation, and present surfaces of many thousand square feet of perfectly naked rock, in which the veins and mineralogical structure are beautifully laid bare to the eye of the geologist.

It is not to be understood that granite is to be met with only in this abrupt amorphous form. On the contrary, it is sometimes found in immense undulating layers like lava, rising little above the general level of the country, separated by fissures and joints, and running for a considerable distance in a given direction like a regular chain of hills. The horizontal fissures often impart a pseudo-stratified appearance, and when crossed by others nearly vertical, give the whole the semblance of some huge wall of cyclopean masonry. The cuboidal masses composing these walls weather by a process of concentric exfoliation into spheroids. This process occurs often on a grand scale, and the exfoliated portions compose segments of circles of many yards radii. This decay of lofty granitic masses produces some of the most picturesque features of an Indian landscape; its strange columnar piles, trees, and logging stones, which far excel those of Dartmoor in grandeur and in the fantastic forms they assume. Some of these piles are held together in the most extraordinary positions, and the blocks composing them are found connected by a felspathic siliceous and ferruginous paste, the result of the decay of the upper masses, washed down and deposited around the joints by the action of the rain. There they stand; some tottering on their base, leaning over and threatening every instant to topple down upon the unwary traveller; others erect, amid a ruin of debris at their feet,—silent monuments of the process of the surrounding decay. Sometimes the summits of the higher elevations are composed of immense monolith peaked masses of granite, which split vertically; the separated portions are often known to descend from their lofty position with the rapidity and thunder of an avalanche. As the rocks waste from the summit, at their base will be usually observed a tendency to a re-arrangement of the component particles of the rock going on in the debris there accumulated. At Chitaldroog may be seen, at the base of a granite cliff which tops one of the hills, a porphyritic-looking mass thus formed of a reddish clayey paste, imbedding reddish crystals of felspar.

Almost every variety of this rock is found, but the prevailing granite is composed of felspar, quartz, mica and hornblende. Quartz, felspar and hornblende, the syenite of some mineralogists, is also common, and runs into the ordinary granite. That beautiful variety called protogine, in which talc, or chlorite, or steatite replaces the mica, is not very common in India, but is met with in a few localities in the west of Mysore. In all these cases chlorite and talc are the replacing minerals, the former predominating. Pegmatite, granite composed of quartz and felspar, is frequently met with; but the variety called graphic granite is rare. Schist granite never occurs as a mountain mass, but is found in veins or patches imbedded in ordinary granite. The same may be said of actinolitic granite, or granite in which actinolite replaces mica. The latter usually is most frequent in hornblendic granite, and the actinolite passes by insensible gradations into hornblende. The felspar of actinolitic granite is usually flesh or salmon-coloured. Porphyritic granite, or granite having large crystals of felspar imbedded in ordinary or small-grained granite, is common. The rock of Sávandroog affords a good example of the prevailing variety. It is composed of a granite base of felspar, quartz, mica and hornblende, imbedding long pale rose-coloured crystals of felspar. Fine granite porphyries are less frequently met with: a beautiful specimen occurs in a large vein or dyke which traverses the gneiss in the bed of the Kávéri at Seringapatam, nearly opposite the sallyport close to which Tipu was killed. It is composed of a basis of compact reddish and salmon-coloured felspar and a little quartz, imbedding lighter-coloured crystals of the same, with needle-shaped crystals of green tourmaline.

The great prevalent mineralogical feature in the granite of Southern India is its highly ferriferous nature. The mica and hornblende is frequently replaced by magnetic iron ore in grains, veins, and beds; and sometimes by fine octohedral crystals of the same, with polarity.

Most of the minerals and ores described as occurring in gneiss are also found in granite.

The ordinary granite is traversed by veins of granites both finer and larger grained: the former pass into eurite, a rock in which all the component minerals of granite are mingled together in one almost homogeneous paste. The minerals composing the larger grained veins are often in a state of segregation and crystallization. The mica, instead of being scattered in minute scales throughout the substance of the rock, is sometimes collected in large plates nearly a foot in length (used by natives for painting on); the quartz in large amorphous nodules, or hexahedral pyramidal prisms of equal length; and the felspar by itself

in reddish layers and beds. The veins and beds of felspar are usually reddish, and penetrated by fissures, which give a prismatic structure : these fissures are often lined with compact felspar, coloured by actinolite, or chlorite, or with drusy crystals of the former mineral, which is also found in nests. Milky quartz is segregated into large beds forming chains of hills, usually containing nests and seams of iron ore, rock crystal, and crystals of amethystine quartz. Both oval and lenticular nests of hornblende and mica occur in granite.

Granite is seen in veins penetrating the hypogene schists. Good examples occur near Seringapatam. In many situations granite appears to have broken through the earth's crust in a solid form ; as is evident from the sometimes unaltered and shattered condition of the strata immediately in contact.

Eurite is found throughout the granite and hypogene tracts, but more frequently among the latter rocks, with which it often has all the appearance of being interstratified ; in the granite it occurs in dykes. The eurite of Seringapatam may be regarded as a type of the petrosilex eurites. It sometimes passes into eurite porphyry, imbedding distinct crystals of laminar felspar. *Diallage*, euphotide or gabbro, occurs at Banavar, about eight miles westerly from Bangalore, associated with gneiss and mica schist. It there presents itself in low elevations, consisting of angular rough masses of the diallage rock, half-buried in a detritus the result of its own disintegration. The masses have not the slightest appearance of stratification ; but are divided by fissures, like granite, into cuboidal blocks. The rock is composed chiefly of diallage and felspar ; the colours of the former varying from light and dark grey to greyish green and bright green. The felspar is white and greyish white ; sometimes in distinct crystals, but generally confusedly aggregated. The general colour of the rock is light grey and greenish grey. The diallage at Banavar has more the appearance of a dyke or vein in the hypogene strata than of an interstratified bed ; but no natural section of the junction line of the two rocks presents itself.

Serpentine.—Near Turuvekere a dark crystalline rock occurs, composed of a dark grey or black talcose paste, imbedding numerous small black crystals of a mineral containing a large proportion of iron, being strongly attracted by the magnet. It bears a beautiful polish ; the surface exhibiting, on close inspection, in the dark shining paste, still darker spots occasioned by the magnetic crystals. It was quarried by the sovereigns of Mysore for architectural purposes, and forms the material of the beautiful pillars which support the mausoleum of Haidar at Seringapatam. This rock has been mistaken for basaltic greenstone,

but it may be a bed of massive ferriferous potstone—here common in the talc schist—elevated, indurated, and altered by one of the basaltic dykes that traverse the rocks in the vicinity. Geologically viewed it has all the characters of a serpentine; and mineralogically it resembles the ferriferous serpentine or ophiolite of Brongniart, which consists of a magnesian paste imbedding disseminated grains of oxidulated iron.

Volcanic Rocks.—*Basaltic greenstone* is universally distributed. It prevails in hypogene areas, diminishes in those occupied by the diamond-sandstone and limestone, and totally disappears in districts covered by laterite and deposits of a more recent epoch. It is most developed in the stretch of table-land between Bangalore and Bellary. It never occurs in continuous overlying sheets like the newer trap, but penetrates in dykes the rocks just described, up to the age of the laterite. These dykes often terminate on reaching the surface of the rock, or before reaching it; while others project from the surface in long black ridges, which, originally like a wall, have since tumbled into both globular and angular fragments by disintegration. Most of the blocks usually remain piled up on the crests of the elevations, while others have lodged on their sides or rolled down to their bases. Many of these blocks have a peculiar metallic or phonolithic sound when struck; the well-known “ringing stones” west of Bellary afford a good example. These black bare ridges of loose stones, standing out in relief against the light-coloured granite or gneiss rocks, add another striking feature to the landscape of the plutonic and hypogene tracts. They often cross the country in a thick network, particularly between Nandidroog and Bagepalli.

In many cases the protrusion of the basaltic greenstone above the general surface of the imbedding rock appears to have been occasioned by the weathering of the latter from its sides. The greenstone thus left unsupported and exposed to atmospheric action soon breaks up by the process of fissuring and concentric exfoliation. In a few instances it appears to have been forced in a semi-solid state beyond the lips of the rent in the rock without overlapping the rock, but none of these projecting dykes have remained in that solid continuous wall-like state in which we see the prominent dykes of Somma or the Val del Bove. Their height above the general level of the country rarely exceeds eighty feet. The direction of the main dykes appears generally to coincide with that of the elevation of the mountains; but if we trace any dyke, the general direction of which in a course of many miles may be north and south, we shall find it to zig-zag and curve in various directions at different parts of its course. Fragments of granite and gneiss, both angular and

of a lenticular form, are sometimes entangled and imbedded in the basalt; and have been mistaken for veins or nests of these rocks. It is evident that, in many instances, the granite and hypogene rocks were solidified prior to the great eruptions of basalt that burst up from below into their seams and fissures, and that the molten fluid imbedded all loose fragments of rock, &c., lying in them. It is probable that many of the fissures themselves were caused, or enlarged, as seen in modern volcanoes, by the expansion of the molten basalt and its gases from below, while struggling for a vent.

The lithologic structure of this rock is as protean as that of granite. In the centre of large dykes we usually find it crystalline and porphyritic; and nearer the edges, less crystalline and more compact; in fact, every gradation of amphibolitic and augitic rocks, from basalt to melaphyre, in the distance of a very few paces. Near the sides, in the compact varieties, may be seen needle-shaped crystals of augite, glancing in confused arrangement here and there in the close texture of the basalt; while a little nearer to the centre the augite almost disappears, and is replaced by fine large crystals of hornblende, and sometimes a few scattered scales of mica. Near the line of contact with gneiss, the basalt often loses its dark colour, and becomes of a faint green, like some varieties of eurite or serpentine, imbedding iron pyrites. This faint green eurite is also seen as a thin vitreous and vesicular enduit on its surface, like the scoriaceous lava found on the surface of the dykes of Etna. The cavities sometimes contain a yellowish-brown powder, which becomes magnetic before the blow-pipe; or small crystals of epidote; in one specimen was found prehnite. The surface of the compact basalt in the dykes is often scored by small fissures, which, as in the Vesuvian dykes, divide the rock into horizontal prisms and run at right angles to the cooling surfaces. All the darker varieties of basaltic greenstone melt into a black or dark-green coloured glass or enamel; and affect the magnetic needle. They are composed of felspar, hornblende and augite, in varying proportions, and occasionally hypersthene.

The minerals most common to these are, iron pyrites, garnets, epidote, and actinolite. These minerals distinguish them from the newer trap, which abounds in zeolites, calcedonies and olivine.

The greenstone occasionally assumes the prismatic columnar forms of the newer basalts, or rather approaches to this structure; thin layers of carbonate of lime often intervene between the joints, and between the concentric layers of the globular greenstone. In many instances the basalt has a fissile structure, which, when intersected by joints, form prisms well adapted for building purposes. In some cases, under the

hammer it breaks into rhomboidal fragments, the joint planes of which are marked superficially with dark brown or blue dendritic appearances on a pale yellow or brown ground.

Rocks altered by Dykes.—Granite and gneiss in contact with a dyke usually become compact, or tough, or friable; the felspar crystals lose their brightness and a portion of the water of crystallization, become opaque and of porcelain hue; the mica is hardened and loses its easily fissile lamellar character. In gneiss it may be seen replaced by minute crystals of tourmaline, epidote and garnet, as near Chanraypatna. Limestone is converted into chert, or becomes siliceous; sandstone into quartz; and clay slate into basanite and jasper.

In districts most intersected by dykes a general tendency to crystalline and metallic development will be remarked, as well as an increase in the deposition of saline and calcareous matter, apparent in extensive layers of kunker, and efflorescences of the carbonate, muriate, and sulphate of soda. The fissures through which the springs charged with these minerals rise, were originally caused, perhaps, by the same disruptive forces that opened vents through the earth's crust to the molten basalt: and it is not improbable that these minerals and sulphates have their origin in causes connected with these ancient subterranean volcanic phenomena. Frequently no alteration is to be traced in the rocks in contact with dykes; a circumstance readily accounted for when we reflect that the temperature of the injected rock is liable to great variation. In certain localities, indeed, the basalt appears to have been reciprocally acted upon by the rock it has traversed.

Aqueous Rocks.—*Sandstone and Limestone.*—Resting immediately on the hypogene and plutonic rocks are found beds of limestone, sandstone, conglomerate, argillaceous, arenaceous, and siliceous schists. Next to the hypogene schists, and the associated plutonic rocks, these limestone and sandstone beds occupy perhaps the greater portion of the area north of a line drawn through Sira to the west. They are most frequently observed exposed in the vicinity of the great drainage lines of the country and occur in irregularly-shaped patches, separated usually by broad and apparently denuded zones of the subjacent hypogene and plutonic rocks.

The tracts occupied by the limestone and sandstone beds present a diversified aspect, sometimes flat and monotonous, and at others, near lines of plutonic disturbance, bare, rugged and picturesque. The limestone in some situations has evidently been denuded of the usually superjacent sandstone, dislocated, and elevated several hundreds of feet above the general level of the surrounding country in regular

ranges, and often in highly-inclined strata. Caps of sandstone, though in such cases often wanting, are sometimes seen still covering the limestone peaks. The outline of these limestone ranges usually presents long, flattish-topped ridges, whose sides and summits are not unfrequently covered with detached angular blocks of the rocks, with a grey, weathered, and scabrous exterior, resembling that of the mountain limestones of Europe.

The sandstone, where undisturbed by plutonic intrusion, occurs in low, flat, wall-like ranges, rising at an almost similar level, rarely exceeding 500 feet from the surface of the surrounding country, supporting table-lands of some extent and evidently once continuous. It is often intersected by deep fissures, extending from the summit of the rocks down to the base. When disturbed by plutonic force, the sandstone exhibits a striking contrast in its outline to the tame horizontal aspect it assumes at a distance from the axes of disturbance. It rises in bold relief against the sky in lofty rugged cross or hogbacked and crested hills, with precipitous mural ridges, which, rarely running at the same level for any distance, are interrupted by portions of the same ridge, thrown up at various angles with the horizon in steep and often inaccessible cliffs. When it crests the hypogene rocks, the lower part of the elevation is often composed of the latter to the height of about 200 to 400 feet, the slope of which has usually an inclination of from 15° to 20° ; while that of the cap of sandstone presents a steep or precipitous declivity varying from 45° to 90° , giving a decided character to the aspect and configuration of the mountains and ranges thus formed.

The hills of arenaceous schists are to be recognized from the more massive sandstones by their undulating, round-backed summits, and their buttressed and dimpled flanks; while those of the softer slates and shales affect the mammiform outline.

Both limestone and sandstone beds, there is little doubt, were formerly of greater extent than now, and owe much of their present discontinuity and scattered positions to the agency of plutonic disturbance and subsequent denudation. The tracts of country intervening between their areas are usually occupied by granitic and hypogene rocks.

Laterite occupies a large portion of the superficies of Southern India. It is found capping the loftiest summits of the Eastern and Western Ghats and of some of the isolated peaks on the intervening table-lands. Beds of small extent occur near Bangalore and Banavasi. That at Bangalore extends northerly towards the vicinity of Nandidroog. Hills of laterite are usually distinguished by their long, low,

flat-topped character, assimilating those of the trap and horizontal sandstone formations. The lands they support are, however, not so much furrowed as those of the sandstone by water channels, a circumstance ascribable to the drainage passing rapidly off through the pores of the rock. When capping detached rocks, the laterite usually imparts to the whole mass a dome-shaped or mammiform outline, or that of a truncated cone.

On the surface of table-lands it is spread out in sheets, varying from a few inches to about 250 feet in thickness, terminating on one or two sides in mural escarpments. Immense detached blocks, generally of a cuboidal shape, are often seen occurring on the flanks of the Western Ghats, and on the southern slopes of the Sondur hills, often separated and dislodged. The valleys intervening between ranges of laterite hills are generally winding, like those formed by the course of a stream, and flat-bottomed, particularly in districts where it overlies the newer trap.

The laterite varies much in structure and composition ; but generally speaking it presents a reddish-brown or brick-coloured tubular and cellular clay, more or less indurated ; passing on the one hand into a hard compact jaspideous rock, and on the other into loosely aggregated grits or sandstones, and into red sectile clays, red and yellow ochre, and white porcelain earth, plum-blue, red, purplish and variegated lithomarges. Sometimes it presents the character of a conglomerate, containing fragments of quartz, the plutonic, hypogene and sandstone rocks and nodules of iron ore derived from them, all imbedded in a ferruginous clay. The cavities are both vesicular, tubular and sinuous ; sometimes empty, but in the lower portions of the rock usually filled, or partly filled, with the earths and clays above mentioned, or a siliceous and argillaceous dust, often stained by oxide of iron. A species of black bole, carbonized wood and carbonate of lime sometimes occur, but rarely, in these cavities. Minute drusy crystals of quartz not uncommonly line the interior. The walls separating the cavities are composed of an argillo-siliceous paste, often strongly impregnated with iron and frequently imbedding gritty particles of quartz. The oxide of iron prevails sometimes to such an extent as to approximate a true ore of iron, and the nodules are often separated and smelted by the natives in preference to using the magnetic iron ore, which is more difficult to reduce, from its greater purity. When the whole mass is charged with iron and very vesicular (not unfrequently the case) it might easily be mistaken for iron slag. The colour of the *parietes* separating the tubes and cells, which in the less ferruginous varieties is a light brick-red or purple, changes into a liver-

brown, having externally a vitrified or glazed aspect ; while the surface of the interior cavities puts on iridescent hues. The walls of these cells are sometimes distinctly laminated.

The air-exposed surfaces of laterite are usually hard and have a glazed aspect, and the cavities are more empty than those in the lower portion. A few inches or more below the surface the rock becomes softer, and eventually as it descends so sectile as to be easily cut by the native spades, but hardens after exposure to the atmosphere. Hence it is used largely as a building stone in the districts where it prevails, and to repair roads. From its little liability to splinter and weather (time appears to harden it), it is a good material in fortifications. The accumulation of the clays and lithomargic earths in the lower portions of the rock, which absorb some of the moisture percolating from above, renders the mass soft and sectile. These earths doubtless existed once in the upper cavities of the rock, from which they have been gradually removed to the lower strata by the downward action of the water of the monsoon rains. They accumulate at various depths from the surface, and form impervious beds, on the depressions of which the water collects, forming the reservoirs of the springs we often see oozing from the bases and sides of lateritic hills and cliffs. Some of the tubes and cavities are *culs de sac*, and do not part with their contents ; but the generality have communication with those below them, either directly or indirectly.

Associated Minerals.—Nodular, reniform and pisiform clay iron ore occur pretty generally distributed. Large beds and nests of lithomargic earths, and white porcelain earths, are not uncommon.

Older Alluvium.—The designation of alluvium is here used in its extended sense to indicate certain beds of gravel and sand that are occasionally found covered by the regur deposit, and which occur in such situations as not to be accountable for by the agency of existing transporting powers ; simply prefixing the term “older” to distinguish it from the alluvium now forming from the disintegration of rocks washed down by the rains and springs, and transported by rivers and local inundations.

In the valleys of the Bhima, Krishna, Tungabhadra, and other large rivers are occasionally seen beds of alluvial gravel elevated beyond the highest existing inundation lines. Some of these deposits may be ascribable to shifts from time to time in the course of the river's bed ; a few to the action of rain in bringing down alluvium from the mountain sides ; but the majority appear to have been accumulated under conditions not now in existence ; probably, during the slow upheaval of the Western Ghats and plateau of the Dekhan, when the water

occupied a much greater extent than at present. In many places the rivers have cut their way through these deposits ; in others, channels exist of rivers, where now no water flows, or but a diminutive streamlet. Thus the Moyar valley, which runs along the table-land of Mysore by the base of the Nilgiris, differs entirely from a common mountain glen. Though a mile or more in breadth at some points, yet it is rather a ravine or fosse cut in the plain and not hemmed in by mountains. It opens out into the lower plain of the Carnatic at the Gajalhatti pass : the sides are precipitous, and its bed very much like the deserted channel of a river. The only stream now flowing in it is the Moyar, which, even in the monsoon, does not fill one hundredth part of its breadth and height : yet this singular excavation, extending some thirty miles in length, is unquestionably a waterworn channel. It is no fissure ; for its bed is quite solid and connected and composed of strata of the hypogene rocks.

Regur or Black Cotton Clay.—This singular deposit, which in sheets of considerable thickness covers at least one-third of Southern India, is less common in Mysore. The plains occupied by the cotton soil are in general marked by their horizontal sea-like surface and almost treeless aspect. It covers the kunker and gravel beds just described, and is generally seen as a surface soil ; but if we examine the edges of great sheets they will generally be found to dip for some distance under the recent alluvium, which conceals and replaces them as a surface soil. It not only covers extensive plains, but the tubular summits of hills overlooking those of the sandstone and limestone, newer trap and laterite formations, far above the present drainage level of the country : it covers all rocks from the granite to the laterite and kunker, and often fills up depressions and chinks in their surface.

The purest regur is usually of a deep bluish-black colour, or greenish or dark greyish black. The quantity of iron it contains is not sufficient to account for the black colour of this soil, which may be partly attributed to the extractive or vegetable matter it contains. The regur is remarkably retentive of moisture ; a property to which is ascribable much of its fertility. During the dry season, when the crops are off the ground, the surface of regur, instead of presenting a sea of waving verdure, exhibits the black drear aspect that the valley of the Nile puts on under similar circumstances, and which powerfully reminds one of the regur tracts of India. Contracting by the powerful heat of the sun, it is divided, like the surface of dried starch, by countless and deep fissures, into figures usually affecting the pentagon, hexagon and rhomboid. While the surface for a few inches in depth is dried to an impalpable powder raised in clouds by the wind and darkening the

air, the lower portions of the deposit, at the depth of eight or ten feet, still retain their character of a hard black clay, approaching a rock, usually moist, and cold; when the surface dust has a temperature of 130°. In wet weather the surface is converted into a deep tenacious mud.

The purest beds of regur contain few rolled pebbles of any kind; the nodules of kunker we see imbedded have probably been formed by concretion from the infiltration of water charged with lime; and it is only near the surface that the regur becomes intermingled with the recent alluvium of the surrounding country, or in its lower portions, where it becomes intermingled with the débris of whatever rock it happens to rest on,—trap and calcedonies in trappean districts; granite, sandstone, pisiform iron ore and limestone, in the plutonic and diamond sandstone areas. It sometimes exhibits marks of stratification.

That the regur of India is an aqueous deposit from waters that covered its surface to a vast extent, there is little doubt: but it would be difficult to point out at the present day the sources whence it derived the vegetable matter to which in great measure it owes its carbonaceous colour, and the rocks from the ruins of which its remaining components were washed.

Kunker.—The calcareous deposit termed *kunker*¹ is irregularly distributed in overlying patches. No tract is entirely free from it, with the exception, it is said, of the summits of the Nilgiris. It occurs, however, at the height of 4,000 feet above the sea among the ranges on the elevated table-lands. It is most abundant in districts penetrated and shattered by basaltic dykes, and where metallic development is greatest. It is perhaps least seen in localities where laterite caps hypogene or plutonic rocks. It occurs filling, or partially filling, fissures and chinks in the subjacent rocks, in nodular masses and friable concretions in the clays and gravels above the rocks, and in irregular overlying beds, varying from a few inches to forty feet in thickness. It has been found at the depth of 102 feet below the surface of the surrounding country, prevails alike in granite, the hypogene schists, the diamond sandstone and limestone, and in the laterite: hence the springs which deposit it must bring up their supply of calcareous matter from sources deeper beneath the earth's crust than the limestone.

The older kunker is usually of a light brownish, dirty cream, reddish or cineritious grey tint; sometimes compact and massive in structure,

¹ A Hindustani word کنکر but of Sanskrit extraction, signifying a nodule of limestone or pebble of any other rock.

but more usually either of a nodular, tufaceous, pisiform, botryoidal, or cauliflower-like form. Its interior is sometimes cancellar, or slightly vesicular; but compact or concentric in the pisiform and nodular varieties. Its interior structure is rarely radiated. When compact it resembles the older travertines of Rome and Auvergne. It aggregates in horizontal overlying masses, usually intermingled with the soil without much appearance of stratification. It is broken up and used as a rough building stone in the bunds of tanks, walls of inclosures, &c., by the natives, and is universally employed to burn into lime.

In the banks of rivers it is often seen concreting in stalactiform masses round the stems and roots of grasses, which, decaying, leave casts of carbonate of lime. This lime, held in solution and suspension by existing streams, mingling with the fine particles of sand and ferruginous matter in suspension, sets under water like pozzolana; and uniting the shells, gravel, sand, and pebbles in the bed and on the banks, forms a hard and compact conglomerate.

Its origin may be referred to the action of springs, often thermal, charged with carbonic acid, bringing up lime in solution and depositing it as the temperature of the water gradually lowered in rising up to the earth's surface or in parting with their carbonic acid.

Modern Alluvia.—Where regur does not prevail, the ordinary soils are distinguished by a reddish tinge, owing to the great prevalence of oxide of iron in the rocks of which they are, in great measure, the detritus. Patches of white soil occur, and are usually the consequence of the weathering of beds of quartz, or composed of kunker, which abounds so generally, and enters into the composition of almost every variety of soil. These white soils are characterized by sterility. In tracts of country shaded by eternal forests, for instance the Ghats, and sub-ghat belts, a dark vegetable mould prevails,—the result of the successive decay and reproduction of vegetation for a series of ages, under the stimulating alternations of excessive heat and moisture. In such regions, where unsheltered by forest and in exposed situations, the soil is either lateritic or stony according to the nature of the subjacent rock.

At the bases of mountain ridges we usually find an accumulation of large angular blocks, composed of the same rocks as the hills down whose declivities they have rolled in weathering. At a greater distance from the base in the plain, these are succeeded by pebbles, whose reduced size, mineral composition, and worn angles proclaim them to have travelled from the same source, diminishing in bulk the further we recede from the mountains, until they pass, by the gradations of grit

and sand, into deposits of a rich clay or loam. Such are the gradations generally to be traced in the modern rock alluvia, and which strikingly distinguish them from the vegetable soil of the forest tracts and the regur, which are often seen in the state of the greatest richness and fineness of composition at the very bases of the hills and resting immediately on the solid rock.

The alluvia brought down by the streams from the Western Ghats flowing easterly to the Bay of Bengal, are usually composed of silt, sand and gravel—detritus of the rocks over which they have passed: they almost always contain a considerable portion of lime derived from the springs which supply them, and from the limestone and kunker beds over which most of them flow. The alluvia of the rivers of the western coast are of a more carbonaceous and less calcareous character, owing to the greater absence of lime in the formation, and the dense forests and luxuriant vegetation which almost choke their passage.

During the hot season, when the surface of the alluvial sand in the beds of the rivers and rivulets is perfectly dry, a stream of clear water is frequently found at various depths below them, stealing along or lodging in the depressions of some impervious layer of clay or rock, to which it has sunk through the superincumbent sand. So well is this fact understood by natives, that in arid, sandy tracts, where not a drop of water is to be seen, they will often be enabled to water whole troops of horse and cattle by sinking wells a few feet deep through the sands of apparently dried-up rivulets.

The benefit resulting from the admixture of lime into soils consisting almost solely of vegetable, siliceous, or argillaceous matter, is too well known to be dwelt on here; and it is a remarkable and bountiful provision of nature in a country like Southern India, where limestone is so rarely seen in the rocks from which a great part of its soil is derived, that innumerable calcareous springs should be constantly rising through the bowels of the earth to impregnate its surface with this fertilizing ingredient.

The alluvia of Southern India are remarkable for their saline nature. The salts by which they are impregnated are chiefly the carbonate and muriate of soda, which prevail so much (particularly in mining districts) as to cause almost perfect sterility. The carbonate appears on the surface covering extensive patches, in frost-like efflorescences, or in moist dark-coloured stains, arising from its deliquescence in damp weather or by the morning dews. Where such saline soils are most prevalent there will be usually a substratum of kunker, or nodules of this substance, mixed with the soil; and there can be little doubt that their origin may

be referred to the numerous springs rising through the fissures or laminæ of the subjacent rocks, some charged, as already noticed, with carbonate of lime, and others with muriate of soda and sulphate of lime. The carbonate of soda, like the natron of Egypt, is the result of a mutual decomposition of the muriate of soda and carbonate of lime. It may be as well to remark that muriate of lime is invariably found in the saline soils of India, which are known to the natives by the term *chaulu*. The soda soil is used by the *dhobis*, or washermen, to wash clothes with, and hence is called washermen's earth; it is also employed by the natives in the manufacture of glass.

Both the carbonate and muriate of soda are found mingled in varying proportions, in white efflorescences, in the beds and on the banks of springs and rivulets.

Nitrous Soils.—Soils impregnated with nitre are found on and around the sites of old towns, villages, &c. Here a vast quantity of animal matter must gradually have been blended with the calcareous and vegetable soil: from their decomposition the elements of new combinations, by the agency of new affinities, are generated:—nitrogen from the animal, and oxygen, &c., from the vegetable matter. The nitric acid thus produced combines with the vegetable alkali, forming the nitrate of potass, while its excess, if any, combines with the lime, forming a deliquescent salt,—the nitrate of lime. The affinity lime has to nitrogen and oxygen materially assists the formation of the acid by their combination. The natives of India, in their rude manufactories of salt-petre, act upon these principles without being aware of their rationale. Having collected the earth from old ruins, or from places where animals have been long in the habit of standing, they throw it into a heap mingled with wood ashes, old mortar, chunam, and other village refuse; and allow it to remain exposed to the sun's rays and to the night dews for one or two years, when it is lixiviated. The salt obtained is not very pure, containing either the muriate and sulphate of soda or potash, or nitrate and muriate of lime.

Nitrous soils are easily recognized by the dark moist-looking patches which spread themselves irregularly on the surface of the ground, and by capillary attraction ascend walls of considerable height. They are more observable in the morning before the sun has had power to dissipate the dews.

Auriferous Alluvia.—The alluvium brought down by the rivers flowing easterly towards the Bay of Bengal is usually silt, sand, or calcareous matter,—detritus, as before observed, of the rocks over which they pass; while that of the rivers flowing westerly is of a more carbonaceous character. Most of these alluvia are auriferous, particularly those

of the Malabar and Canara coasts, but grains of gold are also found in considerable abundance in the alluvial soils of Mysore.

Betmangala lies, on the eastern flank of the principal gold tract, which, according to Lieutenant Warren, who examined this district in 1802, extends in a north-by-east direction from the vicinity of Budikote to near Ramasamudra. The gold is distributed in the form of small fragments and dust throughout the alluvium covering this tract.

At Markuppam, a village about 12 miles south-west from Betmangala, were some old gold mines, worked by Tipu without success. The two excavations at this place demonstrated the great thickness, in some parts, of these auriferous alluvia. They were 30 to 45 feet deep respectively. There can be little doubt that the auriferous black and white stones in these mines were fragments from the gneiss, granite and hornblende schist which base this auriferous tract, and constitute the singular ridge which runs through it in a north and south direction, and which may be regarded as having furnished most of the materials of the reddish alluvium on its east and west flanks, and therefore as the true matrix of the gold. The orange-coloured stones were caused by the oxidation of the iron in the mica.

This auriferous range on the table-land of Mysore may be traced to the Eastern Ghats, southerly, by the hill fort of Tavuneri, to the south of Kaveripatnam matha in the Amboor valley. Two passes, however, break its continuity near Tavuneri. To the north it appears to terminate at Dásarhosahalli; though the line of elevation, taking a gentle easterly curve, may be traced by the outliers of the Bétaráyan hills, Amani konda or Avani, Mulbagal, Kurudu male, Rájigundi to Ramasamudra in the Cuddapah collectorate, a little west of Punganur.

Dunes.—Sand dunes are not confined to the coasts, but are seen on the banks of the larger rivers in the interior, as at Talkád on the Kávéri. During the dry season, the beds of these rivers, deriving but a scanty supply of water from perennial springs, usually present large arid wastes of sand. These are acted upon by the prevailing westerly winds, which blow strongest during the months of June, July, and August, and raise the sand into drifts, which usually advance upon the cultivation in an easterly direction. The advance of these moving hills is usually very regular where no obstruction presents itself, such as high bushes, trees, hedges, &c., which are often planted by the natives purposely to arrest the progress of these invaders on their cultivated lands. The sand is often held together and retarded by the embraces of the long fibrous plants that grow up and are interwoven with its layers. (*See account of Talkád, Vol. II.*)

TRAVERSE NOTES.

From the Bisale Ghat to Betmangala, by Captain Newbold, F.R.S.

At the western foot of the pass, and along the base of the Subrahmanya hill, hornblende rock containing garnets and dark-coloured mica occurs, with veins of a very large-grained granite composed of white quartz, red and white felspar, and silvery mica in very large plates: gneiss is seen on the steep face of the ghat, and hornblende rock, often coated with the red clay and its own detritus. This formation continues to the summit of the ghat. At Uchchangi the formation is generally gneiss. One of the hills of this rock is crested by hornblende rock in large prismatic masses. Patches of laterite occur covering these rocks in various localities, and a few bosses of granite:

Near Kenchamman Hoskote I crossed the Hemavati, one of the principal tributaries to the Kávéri, in a canoe. It is about fifty paces broad, with steep banks of clay, silt, and sand with mica. Near the village, mammillary masses of gneiss project from the red alluvial soil. This rock has here lost much of its quartz, and is of that variety of thick-bedded gneiss which in a hand specimen might pass for granite; the felspar is often of a reddish tint. Laterite is found in this vicinity a little below the surface in a soft sectile state. At Hassán gneiss and hornblende schist are still the prevalent rocks. Talc slate with layers of a fine greenish potstone interstratified also occurs. The mica in the gneiss near Gráma is sometimes replaced by talc and passes into protogine.

After exploring the corundum pits of Gollarhalli, I passed through Chanráypatna and Bellur to Hutridurga. Granite, protogine, gneiss, talcose and hornblende schists, penetrated occasionally by trap dykes, constitute the formation, overlaid here and there by patches of laterite or kunker on which rests the surface soil. The latter is usually reddish and sandy. Sometimes these deposits are wanting, when the substratum consists of the gravelly detritus of the subjacent rocks. At Belladaira a large bed of ferruginous quartz occurs. The mass of granite on which stands the fortress of Hutridurga is somewhat saddle-shaped, and runs nearly north and south; it terminates abruptly at either extremity. The northern extremity, crowned by the citadel, is a sheer scarp of rock nearly 200 feet high; its base is rugged with large precipitated masses. The granite is similar to but less porphyritic than that of Sávandurga.

From Hutridurga I proceeded to Magadi, and thence ascended the stupendous mass of Sávandurga. The country for a considerable distance is wild and woody, abounding with low hills and rocks, among which a porphyritic granite prevails. A magnetic iron sand is found in the beds of almost all the rivulets. I ascended the rock from the north-east side. The major axis of the mass runs nearly east and west, and is crossed at right

angles by a profound fissure, which cleaves the rock from summit to base into two distinct portions, both fortified, so as to be independent of the lower fort. It is entirely composed of a granite, which from small-grained may be seen passing into the large-grained and porphyritic varieties. Some of the crystals of reddish felspar on the Karidurga were nearly two inches long, imbedded in small-grained reddish granite.

The principal rock at Távarekere is gneiss, with fragments of iron-shot quartz, green actinolitic quartz, felspar, fragments of hornblende schist, gneiss, granite and basaltic greenstone scattered over the face of the country, and occasionally patches of kunker. Near Bánávar I found diallage rock, projecting in large, angular, scabrous blocks from the top and sides of a low elevation. The great mass of the rock was chiefly white felspar and quartz. The crystals of diallage were well defined, and passed from dull olive-grey shades to the lively decided green of smaragdite. There was more quartz in this diallage rock than is seen usually in the euphotides of Europe; and the external aspect of the blocks was almost trachytic in its roughness. Not far hence, the gneiss with which the diallage is associated, apparently as a large vein, loses its mica, which is replaced by minute silver scales of graphite.

Gneiss is the prevalent rock about Bangalore, penetrated by dykes of basaltic greenstone, and occasionally by granite, as is seen near the petta and adjacent fields. The granite in these localities splits into the usual cuboidal blocks or exfoliates into globular masses. It often contains hornblende in addition to mica. The gneiss strata, though waving and contorted, have a general north and south direction, and often contain beds of whitish quartz preserving a similar direction. The strata are nearly vertical. Approaching Bangalore from the north-west, a bed of laterite is crossed, forming a hill (*Oyáli dinne*) on which stands a small pagoda. This bed extends northerly in the direction of Nandidroog, where laterite also occurs. In other situations, covering the gneiss and granite, a reddish loam is usually found, varying from a few inches to twenty feet in depth, containing beds of red clay, used in making tiles, bricks, &c.; the result evidently of the weathering of the granite, gneiss, and hornblende rocks. A similar formation continues to Kolar. The gneiss is occasionally interstratified with beds of hornblende schist. Granite, gneiss, and hornblende are the prevailing rocks at Betmangala. About eight or nine miles east of this the Mysore frontier is crossed into South Arcot. Kunker occurs on the banks of the rivulet near the village, both on the surface and in a bed below the alluvial soil. Efflorescences of muriate of soda are also seen in the vicinity.

From Seringapatam to Coorg, by the same.

From Seringapatam my route lay westward over a stony, kunkerous, uneven, and rather sterile tract to the banks of the Lakshmantirtha. The formation at Hunsur is a micaceous gneiss with veins of quartz, and beds of the same mineral evidently interstratified with the layers of gneiss. These beds, on weathering, leave the surface-soil covered with their angular and

rust-stained fragments. Glimmering hornblende rock, veined with milky quartz, and a pale flesh-coloured felspar alternate with the gneiss. The outgoings of two or three dykes of basaltic greenstone are passed on the roadside. The surface of the country from Seringapatam gradually rises as it approaches the Ghats.

The country between Hunsur and the Ghats is a succession of rocky risings and falls of the surface, covered for the most part with reddish alluvial soil, over the face of which are scattered numberless angular fragments of the surrounding rocks; especially white and iron-stained quartz, and occasionally kunker. Some of these alluvia have not travelled far, since we often find the colour of the surface-soil a true index to the nature of the rock beneath; viz, dark red or coffee-coloured soil over hornblende rock and trap; light red to sandy soil over gneiss and granite; light greenish-grey over talc schist; and white, or what is nearly white, over felspar and quartz rocks. The quartz beds, being usually harder than their neighbours, are written in white bas-relief characters over the face of the country. They never weather—like the felspars, hornblendes and micaceous rocks—into clay, but usually break up into fragments by imperceptible fissures, into which water, impregnated with iron from the surrounding weathered rocks, soon insinuates itself and stains the rock. At length the particles composing the fragments themselves lose their cohesion and break up into an angular gritty sand.

At Periyapatna basaltic greenstone is seen in the bed of a nullah crossing the gneiss and hornblende rock, and veined with kunker. Large blocks of fine red granite are seen in the ruined fort walls, brought evidently from no great distance. The Ghat line west of Periyapatna presents a succession of round-backed hills and smooth knobs, which continue to Virarajendrapet in Coorg. Their surface is covered with dark vegetable mould, and shaded by a fine forest, the roots of which strike into the red loam or clay on which the vegetable mould rests. It produces excellent sandalwood.

At the Gersoppa Falls, by the same.

The precipice over which the water falls affords a fine section of gneiss and its associated hypogene schists, which dip easterly and northerly away from the Falls at an angle of about 35°. The gneiss is composed of quartz and felspar, with both mica and hornblende, and alternates with micaceous, talcose, actinolitic, chloritic and hornblende schists, imbedding (especially the latter) iron pyrites. These rocks are penetrated by veins of quartz and felspar, and also of a fine-grained granite, composed of small grains of white felspar, quartz and mica. The mass of hypogene rocks has evidently been worn back several hundred feet by the erosion and abrasion of the cataract; the softer talcose and micaceous schists have suffered most. Rock basins are frequent in the bed of the river, which is worn in the rock and rugged with water-worn rocky masses.

From Jalarpet to Shikarpur (in 1881),¹ by R. Bruce Foote, F.G.S.

The results of combined traverses show that the Mysore table-land is traversed by great bands of granitoid and schistose gneiss, the southerly extensions of some of the great bands recognized in the South Mahratta country. When the whole of this region shall have been geologically examined it is more than probable that all the bands known to the north of the Tungabhadra will be traced far to the south. The traverse now to be described shows that three great bands of schistose rock occur on the Mysore plateau, and that two of these are actual continuations of two of the great schistose bands in Dharwar District. For convenience of description these bands will in the sequel be referred to as the "Dharwar-Shimoga" and "Dambal-Chiknayakanhalli" bands. Both these bands have been traced across the Tungabhadra, the latter in a chain of hills running down southward to Chitaldroog and Chiknayakanhalli, while the former forms another chain of hills passing Harihar and Shimoga and stretching further south towards Hassan. These bands are of considerable width, the Dambal-Chiknayakanhalli band, which is considerably the narrower of the two, measuring 18 miles across where crossed by the line of section. In addition to their geological interest, these two bands are of importance, as within their limits occur several of the auriferous tracts which have of late attracted so much attention. The Dharwar-Shimoga band is slightly auriferous at its northern extremity, and streams rising on it near Bail Hongal and Belavadi in the Sampgaon taluq of Belgaum District used formerly to be washed for gold. The auriferous tract of Honnali lies within the same schistose band a little to the north of Shimoga. The Dambal-Chiknayakanhalli band contains the auriferous tract of the Kapputgode hills near Dambal, to the north of the Tungabhadra; while south of that river, on the Mysore plateau, near the town of Chiknayakanhalli, are quartz reefs reported to be auriferous, and which have attracted the notice of several speculators, who have taken up land for mining purposes.

This schistose band is seen to stretch away far to the south-south-east in a line of low hills, and is said to extend to Seringapatam, passing that place and the town of Mysore to the eastward, and then trending round to the south-west and continuing into south-eastern Wynád, where it forms the gold-field around Devala. This tallies with Mr. King's observations in the Wynád, a strong band of schistose gneiss having been shown by him to occur at and around Devala, in which chloritic schists occupy an important position. My informant as to this extension of the Dambal-Chiknayakanhalli band was Mr. Lavelle, the pioneer gold-pro prospector of the present time, who has traced the band from the Wynád north to beyond Chitaldroog. I have no doubt but that Mr. Lavelle's observations will be fully confirmed when the whole of Mysore shall have been surveyed geologically. If the parallelism of strike continues between the southward extension of the Dharwar-Shimoga band and that of the Dambal-Chiknayakanhalli band,

¹ Records of the Geological Survey of India, Vol. XV., Part 4.

it is highly probable that the former will be found to constitute the auriferous tract said to exist in the north Wynád. The stratigraphical relations of the several great bands, both granitoid and schistose, have yet to be worked out, for in the northern part of the great gneissic area they were found too obscure to be satisfactorily explained, and it remains to be seen whether they represent two or more great systems. Their position and relation are shown in the accompanying map and section.

If the line of section be followed from south-east to north-west it will be seen to traverse a region of very typical granite-gneiss, extending from Jalarpet Junction (Madras Railway), for a distance of some 30 miles. This granite-gneiss tract forms the eastern edge of the great Mysore plateau, which is here a wild, rugged, picturesque jungle region.

To the west the section crosses at its narrowest part the band of schistose rocks in which lies, a little to the north of the railway, the now well-known Kolar gold-field, at present a scene of energetic mining work on the lands taken up by a number of large Mining Companies. This schistose band, which will be most appropriately called the Kolar schistose band, forms an important synclinal trough resting on the adjacent granite-gneiss rocks. It is the only one of the great schistose bands whose relations to the associated bands of granitoid rocks have (as yet) been distinctly traced. A fuller account of this band with especial reference to its auriferous character will be given further on. (*See p. 43.*)

On crossing this Kolar gold-field band, the section trends northerly as far as the Bowringpet railway station, when it bends sharp round to the west and continues in that direction as far as Bangalore. The very broad band of granitoid gneiss, which extends between the Kolar gold-field schistose band to the second great schistose band (the Dambal-Chiknayakanhalli band), forms in its eastern part an open undulating plain from which rise a few important rocky hills, as the Tyakal, Balery and Vakkaleri hills north of the railway. A number of small low table-topped hills are also to be seen at small distances from the railway, as the Betarayan Betta, $3\frac{1}{2}$ miles north-east of Bowringpet railway station, the Patandur hill, 2 miles south-west by south of the Whitefield railway station, and the low hillock crowned by a mantapam about a mile north of the Maharajah's new palace at Bangalore. These three hillocks are capped with beds of true sedimentary laterite underlain by lithomargic clays. Of precisely the same aspect, both in form and colour, are the Sivasamudra, Jinnagra and Chikka Tagali hills, which lie a few miles north of the railway near the Whitefield and Malur stations. Identical in form and appearance also is a much more extensive development of table-topped plateaus, which are well seen from Betarayan hill, lying several miles to the north and covering a considerable area. The laterite at the north-eastern end of the Patandur hill is distinctly conglomeratic and contains a tolerable number of well-rolled quartz pebbles. The red colour of the sides of these hills and plateaus, added to their sharp-cut tabular shape, makes them conspicuous from considerable distances. No organic remains were found in connection with these laterite beds, and the number of sections examined was not sufficient to enable me to form any positive opinion as to

their origin, and still less so as to their geological age,—but there can be no doubt that they are the scattered outlying remains of a formerly far more extensive formation.

To the north-west of Bangalore the undulation of the country increases considerably, and the streams run in much deeper channels, affording more numerous sections both of the surface soil and sub-rock. The surface of the country is generally covered with a thick layer of red soil, which often contains a large percentage of pisolitic iron (hæmatite) in segregational form.

Thirty-two miles north-west of Bangalore the section cuts across the line of hills¹ running north and south from the Kávéri river, a little east of the great Falls, up to Nidugal on the frontier of the Anantapur District. This line of hills culminates close to the section in the fine peak of Sivaganga, which attains the height of 4,559 feet above sea-level. Like many other groups of granitoid-gneiss hills in the south, these hills are very rocky and bare, and look as if they had never been covered with a real forest growth.

The section maintains its north-westerly course up to Tumkur, beyond which town it turns suddenly westward and, after a course of 16 miles, in which remarkably few outcrops of rock are seen, meets the second great band of schistose rocks in the line of hills rising between Hagalvadi and Chiknayakanhalli. This second great band of schists is the southerly continuation of the Dambal-Chiknayakanhalli schist band as defined above. The width of this extremely well-marked schistose band, which the section crosses at right angles, is 18 miles. The character of the scenery is markedly different; smooth, grass-grown hills, generally well rounded, with very few conspicuous exposures of rock, take the place of the bold rocky bare hill masses seen east of Tumkur. The rocks consist of hornblendic, chloritic and hæmatitic schists cropping out at very high angles or in vertical beds. Several large quartz reefs occur traversing these schists, and one large one crosses the road some distance west of Doddiganhalli. Time did not allow of my doing any prospecting here, but several prospectors have stated that their researches were rewarded by the discovery of gold in appreciable quantity both in the quartz and by washing the local soils. The extension southward of this schist band may be traced by the eye for many miles, owing to the very characteristic features of the low line of heights which extends south in the direction of Seringapatam. That they extend still further south and then trend south-westward into the south-eastern part of the Wynád may be assumed as a fact on the strength of the information kindly furnished by Mr. Lavelle. The contact of the schists and granitoid gneiss is unfortunately concealed by superficial deposits at the places where the section cuts across their respective boundaries; but the impression left in my mind by the general appearance of the localities was that the schists were overlying the granitoid beds, and the same relation appeared to me to exist in the Dambal gold-field, as far as its western boundary is concerned.

¹ The expression line of hills is used in preference to the term chain, as there is little continuity of high ground, the hills being mostly quite detached and separated in some parts by considerable spaces.

The eastern boundary of the schist band was not traced near Dambal and Gadag, but further north it is completely hidden by the tremendous spread of cotton soil there prevailing. Passing on a little to the south of west from the schistose band the section runs across a granitoid-gneiss region, and after passing Tiptur crosses the watershed between the Kávéri and Krishna hydrological basins, the section trending more and more north-westerly along a rapid descent. It leaves the high, picturesque, granitoid hill masses of Hirekal Gudda and Gardangiri to the right, and beyond Banavar skirts the eastern boundary of the third or Dharwar-Shimoga schist band for several miles, but does not actually leave the granitoid rocks till it has passed Kadur by some six miles. The rocks of this granitoid band, which may for convenience be called the Mulgund-Kadur band, offer no speciality calling for remark. Like the hilly region running east of Tumkur, the hills may preferably be described as forming a line rather than a chain, for they occur in numerous detached masses.

As just mentioned, the section gets on to the third schistose band six miles to the north-west of Kadur, and here the schists are mostly chloritic of pale colour with intercalated more highly siliceous bands, ranging from chloritic gneiss to quartzite. To the south of the road the quartzites increase much in development and rise into a high ridge with a great cliffy scarp on the eastern face of Coancancul peak. Further west, to the south of the high road, rises a considerable hill of very rugged nature, which, when seen from a distance, presents great resemblance to a typical granitoid-gneiss hill. On closer approach the rock is seen to have a very coarsely mottled structure, which turns out to be due to the presence of enormous numbers of well-rounded pebbles of a granite or compact granite gneiss. The size of the included stones ranges in the part I examined from small pebbles to small boulders, all enclosed in a greenish-grey foliated chloritic matrix. The thickness of the conglomerate here exposed must be very great, as proved by the size of the hill which goes by the name of the Kal Droog. To the north, the beds are soon lost sight of under the local alluvium of the Kushi river, and they are not seen to reappear conspicuously in the hilly country on the north side of the valley. To the west of the great conglomerate beds follow more schistose beds, and, as seen on the hill slopes south of the road, a great series of quartzites. Near Tarikere, and to the north-west of it, very few exposures of rock are met with as far as Benkipur, but the few that do show through the thick woods which here cover everything, prove the country to be formed of schistose members of the Gneissic Series. About four miles north-west of Tarikere the road crosses a very small outcrop of typical hæmatite schist, striking in a northerly direction. A good deal of rock shows in the bed of the Bhadra river at and above Benkipur, but the forms seen are not very characteristic, and at the time of my passing everything was obscured by a thick layer of slimy mud left by a high fresh in the river. This part of the section would be very unsatisfactory were it not that the schistose character of the beds forming the line of hills extending northward parallel with the valley of the Bhadra shows quite clearly the extension of the rocks seen south-east and east of Tarikere. Between Ben-

kipur and Shimoga very little rock of any sort is seen, but about half-way across the Doab, between the Tunga and Bhadra rivers, a band of fine-grained grey granite gneiss is crossed, while to the east and south of Shimoga town are several conspicuous large masses of a chloritic variety of granite gneiss. The exact relation of these granitoid outcrops to the great schist series further east I had not the opportunity of determining, and am not quite certain whether they represent the eastern border of another great granitoid band, or whether they are part only of an unimportant local band of granitoid rock. I am inclined to think the latter will be found the real condition of things when the country comes to be fully surveyed. The short space of time at my command prevented my making a détour to settle this point. Here, too, the extent and thickness of the jungle growth greatly hide the general surface of the country along the road, while the rainy or misty character of the weather tended much to obscure the appearance of hills at but very moderate distances. Though the exigencies of dâk travelling compelled me to make the détour to Shimoga instead of following the line of schistose beds northward from Benkipur, I am perfectly satisfied as to the fact of these schists continuing northward, and joining those which cross the united rivers forming the Tungabhadra, a few miles below the junction of the Tunga and Bhadra. The country here is much freer from jungle, and many ridges of rock, consisting of quartzites and chlorite schists with rocks of intermediate character, can be traced for miles. This part of the section extends from the bank of the river for rather more than 20 miles,—from the travellers' bungalow at Holalur north-westward to the 'Tavankal-betta Trigonometrical Station, six miles east-by-south of Shikarpur. Along the 12 miles of road between Shimoga and Holalur but little is seen of the older rocks, the road lying close to the left bank of the Tunga and Tungabhadra, and passing almost entirely over the river alluvium which at and to the north-east of the Holalur bungalow forms a coarse bed of rounded shingles, rising a considerable height above the present high flood level of the united rivers.

The most striking features, both orographically and geologically, of this part of the Mysore country are the quartzite outcrops, which are numerous, but of which only the principal ones require notice. Of these the best marked, longest and highest culminates in the Kalva-Ranganbetta, a fine hill rising some 1,200 feet above the plain, and 3,388 feet above sea-level, 16 miles to the north of Shimoga. The out-crop of the great quartzite beds forming this ridge has a distinct dip of some 60° – 65° (on the average) to the north-east. The quartzites are underlaid by a schistose (chloritic) series, the south-western extension of which was not ascertained. Overlying the quartzites, which are generally flaggy in character (but which here and there become so highly charged with scales of pale green chlorite as almost to lose their quartzitic character, and pass into chloritic gneiss), are local beds of true conglomerate,—the first I have met with or heard of in the gneissic rock of the peninsula. The conglomerate has evidently undergone considerable metamorphosis, but its real character and truly clastic origin cannot be doubted when carefully examined. Many of the included pebbles appear to

have been fractured by the great pressure undergone, but their truly rounded character is quite distinct and unmistakable. The beds seen by me and traced for several hundred yards, are exposed a little way up the slope of Kalva-Ranganbetta peak, and a little to the north-west of a small, but rather conspicuous, pagoda, which stands in a little recess. The included pebbles in the conglomerate consist chiefly of quartz, a few of gneiss, and some of what appeared an older quartzite. A second intended visit and closer examination of this very interesting bed was prevented, much to my sorrow, by bad weather. The second in importance of the quartzite ridges has its eastern extremity in the bed and left bank of the first west-to-east reach of the Tungabhadra below the Kudali Sangam, or junction. West of the new high road from Shimoga to Honnali the quartzite beds rise into the Phillur Gudda (hill), and beyond that rise again into a considerable hill some 400 to 500 feet high, and may be followed easily for several miles to the north-west. The quartzitic character is then in great measure or entirely lost by the rock becoming highly chloritic, and the beds can no longer be safely distinguished from the surrounding mass of chloritic schist. In the north-westerly part of this Phillur Gudda ridge several pebbly beds were observed intercalated between the more or less chloritic quartzite. They differed from the Kalva-Ranganbetta beds in being less coarse and having a more chloritic matrix, but had undergone about an equal amount of metamorphosis. A considerable number of quartzite ridges are intercalated between Phillur Gudda ridge, and the southern end of the Kalva-Ranganbetta ridge, which terminates in the Nelli Gudda Trigonometrical Station hill, seven miles west-north-west of the Kudali Sangam. To these ridges may be ascribed the existence of the group of hills they occur in, as but for their greater durability and resisting power to weather action, they would certainly have been worn down to the low level of the purely chloritic part of the schistose band, both to the north-west and south-east. Unless there has been an inversion of the strata on a rather large scale, or faults exist which were not obvious during the rapid survey, the Kalva-Ranganbetta quartzites underlie all the beds to the northward of it. Another series of overlying quartzites is shown to the north-north-west of Kalva-Ranganbetta; but the relation between it and the upper beds just described could not be determined without a much more close examination of the district, more especially as the space between the two sets of outcrops is very largely and closely covered by spreads of regur. The chloritic schists offer no specially interesting features, and they are not, as a rule, well seen, except on the slopes of the hills, the general face of the country being much obscured by red or black soil, which, both of them, occur in great thickness.

Honnali Gold-field.—One remaining point of great interest is the large number of important quartz veins, or reefs, which traverse the belt of chloritic rocks overlying the Kalva-Ranganbetta quartzites. They are the source of the gold occurring in the thick red soil which covers the whole face of the low-lying country, and which has been washed for gold, certainly for several generations past, by several families of Jalgars residing at Palavanhalli. The gold is so generally distributed through the red soil that

it is clear that many of the reefs must be auriferous, and the quantity found is sufficient to justify strong hopes that a profitable mining industry may be developed by working the richer reefs. Several of the series of reefs close to Devi Kop, a little village $3\frac{1}{2}$ miles east-south-east of the Kalva-Ranganbetta, had been carefully and deeply prospected at the time of my visit by Mr. Henry Prideaux, M.E., and in one case certainly with very marked success. The quartz in this case was found very rich in gold, which was visible in grains and scales scattered pretty freely through the mass. The quartz in many parts had a quasi-brecciated structure with films and plates of blue-green chlorite occurring along cracks in the mass. Near the surface the chlorite, with which were associated small inclusions of pyrites, had often weathered into a rusty-brown mass. The reef which at the time of my visit was regarded as the most promising, and to which the name of Turnbull's reef had been given, is one of a series of three that can be traced with some breaks for a distance of six miles nearly parallel with the great quartzite ridge of the Kalva-Ranganbetta, the true strike of the reef being from N. 40° W. to S. 40° E. Another important set of three reefs having the same strike occurs about half a mile north of the first series, but they are not visible for such a long distance, their north-western course being covered by the thick spread of cotton soil. To the south-east they, or at least one of them, can be traced across the Nyamti nullah, which divides the gold-field in two. Out-crops of vein-quartz in a line with a south-easterly extension of this set of reefs are to be seen north and east of Palavanhalli. Numerous other quartz reefs having the same strike occur in the south-eastern half of the gold-field, *e.g.*, a set of four, rather more than a mile north-east of Palavanhalli, and several others to the north of Dasarhalli and south of Kuntra. A few reefs were also noticed whose strike was different from those above referred to. They represent two other systems of fissures, the one running N. 5° E. to S. 5° W. ; the other, W. 5° N. to E. 5° S. Several of both these series are of very promising appearance, the "back of the lode" bearing considerable resemblance to that of Turnbull's reef. The greater number of the reefs in the Honnali gold-field are well-marked examples of these fissure veins.

During my stay at Devi Kop, I watched the results of many washings both of crushed quartz and of the red soil taken from many localities and various levels. The great majority were highly satisfactory. The Jalgars, or local gold-washers, seem to be a fairly prosperous set of men, so their earnings must be fairly remunerative. They confine their attention, as far as I could ascertain, pretty generally to the high-lying red soil banks, between Devi Kop and the Nyamti nullah. The head Jalgar, a very intelligent old man and dexterous gold-washer, informed me that the best day's work he had ever done was the finding of a small pocket in the gneiss which contained about Rs. 80 of gold in small grains and scales. I gathered from him that he had not found anything beyond the size of a "pepite." The position of these auriferous banks near Devi Kop would admit of hydraulic mining over a considerable area by a system of dams and channels to bring water from the Nyamti nullah, but the question of the

profitableness of such an undertaking could only be decided by an expert after careful examination and more numerous trials by washing.

Kolar Gold-field.—The schistose band, which bears within its limits the Kolar gold-field, forms an elongated synclinal fold which in parts rises somewhat over the general level of the surrounding granitoid country. The dip of the rocks forming the basement of the schistose band, and therefore the boundaries of the synclinal fold, is easily traced on both sides; not so, however, is the dip of the uppermost members of the group, for all the beds exposed in the centre of the band have been much altered by great pressure, which has superinduced an irregular slaty cleavage to a great extent. This, combined with extensive minute jointing, has so greatly altered the original texture of the rocks that they have assumed to a very great extent a highly trappoid appearance. The lines of bedding are completely obliterated, and it was impossible to decide from the sections I saw whether the central axis of the synclinal represents one great acute fold, or a series of minor ones in small vandykes. The great petrological similarity of the strata forming the upper (central) part of the synclinal makes the decipherment of this difficulty all the greater. The sections I saw in the several shafts being sunk at the time of my visit threw no light on the subject; it is possible, however, that a closer study of these sections would go far to enable this point to be decided.

The succession of formations seen from west to east, after leaving General Beresford's bungalow at Ajipalli on the road from Bowringpet railway station to the gold-field, is micaceous gneiss (resting on the granitoid gneiss), chloritic gneiss, micaceous schist, hæmatitic quartzite, and chloritic schist, on which rests a great thickness of hornblendic schists, which, as just mentioned, are highly altered, and have their planes of bedding almost entirely effaced by the pressure and crumpling they have undergone. The eastern side of the fold shows near the village of Urigam well-bedded schists—dipping west from 50° to 60° and resting finally on the granitoid rocks. The western side of the gold-field is very clearly demarcated by a well-marked ridge of hæmatitic quartzite which culminates in the Walagamada Trigonometrical Station hill, from the top of which the majority of the mines can be seen. The bedding is often vertical and highly contorted in places. The texture varies from highly jaspideous quartzite to a schisty sandstone. The hard jaspideous variety generally shows distinct laminæ of brown hæmatite, alternating with purely siliceous laminæ, generally of white or whitish-drab colour. It is only here and there, and over very trifling areas, that the ferruginous element ever assumes the character of red hæmatite. The beauty of the "vandykes" and complicated crumpling and brecciations of this rock in the Walagamada Konda is very remarkable. The thickness of the hæmatitic band is very considerable, and it forms the most striking feature of the western side of the gold-field. On the eastern side of the gold-field the hæmatite quartzite is much less well developed and exposed, excepting in the south-eastern part of the gold-field where it occurs in thick beds forming the main mass of the Yerra Konda Trigonometrical Station hill. Here the dip is about 60°

westerly, and affords one of the clearest proofs of the synclinal character of the schist band. To the southward the hæmatitic beds appear to coalesce, the synclinal being pinched together, but I had no opportunity of following up the eastern boundary of the schistose band. The western boundary is a very conspicuous feature, a bold rocky ridge running up into the lofty Malapan Betta peak, the highest summit in this part of the country. South of Malapan Betta the hæmatitic beds appear to lose their importance and no longer form the most striking feature of the schistose band, and micaceous and chloritic beds abound. Owing to the great extent of jungle and the rugged character of the country, their general relations were not to be made out completely in the short time at my disposal. The beds run south into the Salem District, and probably occupy the valley lying east and north-east of Krishnagiri and, not improbably, extend on towards and past Darampuri. A subsidiary ridge of lower elevation, which branches off from the western side of Malapan Betta westward and then trends south-west and finally south-south-west, also consists of schistose beds of similar character, amongst which a hæmatitic quartzite is the most conspicuous. The relation of these latter beds to the Kolar gold-field synclinal fold is quite problematical, but it is very probable that several important faults have caused great dislocation of the strata first along the boundaries of the main synclinal fold. The stratigraphy of the several spurs radiating from Malapan Konda is very complicated and interesting and well worthy of careful consideration.

The auriferous quartz reefs which have attracted so much attention lie in the broader part of the synclinal fold north of the railway. None of any importance were seen by me in the tract south of Malapan Betta. The intermediate tract I had no opportunity of examining closely, but I did not hear of the existence there of any of interest or importance. The reefs make very little show on the surface as a rule; in many cases, indeed, the whole back of the reef, or lodes, has been removed during the mining operations of the old native miners, whose workings were on a rather large scale considering the means they had at command. Much also of the surface is masked by scrub jungle, or by a thick coating of soil, often a local black humus. The reefs are so very inconspicuous that I have not attempted to show them on the map. Their run is north and south with a few degrees variation either east or west. The hade of the reefs is westerly in most cases, as far as they have been tested by the shafts sunk. The angle they make with the horizon is a very high one, on the average not less than from 85° to 87° . Much has been said about the reefs in the Kolar not being true fissure veins, but I was unable to find any good reason for promulgating this view, and several mining engineers of high standing and great experience, as Messrs. Bell Davies, Raynor St. Stephen, and other practical miners well acquainted with the locality, have no hesitation about calling them "fissure veins" or "lodes." The quartz composing the reefs is a bluish or greyish-black diaphanous or semi-diaphanous rock, and remarkably free from sulphides (pyrites, galena, &c.) of any kind. The gold found is very pure and of good colour. Several washings of crushed vein stuff were made in

my presence at the Urigam and Kolar mines with really satisfactory results, the quantity of gold obtained being very appreciable. The samples operated on were not picked ones.

The principal new mines now in progress form a line stretching from south to north on the eastern side of an imaginary axis drawn along the centre of the synclinal fold, and this line coincides with that followed by the "old men," many of whose abandoned workings are being extended to greater depth than they had the power of attaining to without steam-pumping machinery.*

Numerous large dykes of dioritic trap are met with traversing the gneissic rocks of this region. One set of them runs north and south with a variation of about 5° east or west. The other runs nearly east and west. The presence of these dykes will offer formidable obstacles to the mining works in some places, and it will probably be found that the intrusion of these great igneous masses has added considerably to the metamorphism of the schistose beds along the lines they traverse. As already mentioned, the schists are most highly altered along the central axis of the synclinal fold, and the largest of the north and south dykes shows a very little to the east of the synclinal axis.

The Kolar schistose band is the only one as to the exact stratigraphical relation of which to the granitoid gneiss any positively conclusive evidence had been obtained; but there is reason to believe that at least three of the schistose bands to the westward of it, *viz.*, those of Sundur, near Bellary, of Dambal-Chiknayakanhalli, and of Dharwar-Shimoga, are similarly superimposed on the granitoid rocks. Whether the superposition is a conformable or an unconformable one, is a point that has yet to be determined by further investigation; at the Kolar gold-field, however, the relation between the schistose synclinal and the underlying granite gneiss appears to be one of distinct conformity. The Hospet end of the Sundur schist band certainly presents every appearance of being the acute extremity of a synclinal basin. The south-eastern extension of this band is as yet unknown, but there is good reason to expect a considerable extension of it to the south-eastward of Bellary.

The remarkable length of the Dambal-Chiknayakanhalli and Dharwar-Shimoga bands precludes the idea that they can be each a simple synclinal fold, rather may they be expected to prove a succession of synclinal and anticlinal in échelon, with their contact boundaries not unfrequently coinciding with faults. The geographical position of these great bands confirms and amplifies the evidences to the fact which I specially pointed out in my Memoir¹ on the East Coast from latitude 15° N. northward to Masulipatam, that the Peninsula of India had been greatly affected by tremendous lateral forces acting mainly from east to west and thrusting up the gneissic rocks into huge folds. These great foldings have undergone extensive denudation, and the softer schistose beds especially have been entirely removed from large tracts of country which they must have formerly covered, if any of the bands now remaining really represent (as they in all probability do) portions of once continuous formations.

¹ Memoirs, "Geological Survey of India," Vol. XVI.

The schistose bands having only been mapped at different points, their general width, as shown on the annexed sketch map, is only hypothetical, and it is very possible that at intermediate points they may either spread out or narrow considerably. Their relation to the schistose gneissics of the Carnatic Proper has yet to be made clear, and it is not at all unlikely that a third subdivision will have to be recognized in the crystalline rocks of South India—a subdivision which will include the rocks of a character intermediate between the typically schistose rocks and the typically granitoid rocks of Mysore and the South Mahratta country, namely, the massive gneissics of the Carnatic, in which the ferruginous beds are magnetic, not hæmatitic.

From Report on Auriferous Tracts in Mysore (in 1887), by the same.

These tracts lie widely scattered, but may be conveniently grouped (for the purpose of description) in three groups corresponding to the three principal divisions of the great Auriferous rock series¹ which traverses Mysore in great bands in a generally north-north-westerly direction, and forms such important features in the geological structure of the table-land. These three groups may be appropriately termed the *Central*, the *West-Central*, and the *Western* groups; the *Eastern* group being formed by the Kolar gold-field (*see* above, p. 43). The central group belongs to the Dambal-Chiknayakanhalli band of my former paper: and the western group to the Dharwar-Shimoga band of the same. The west-central group includes a number of small outlying strips of schistose rocks, some, if not all, of which are of the same geological age as the great schist bands lying to the east and west.

(Nanjangúd to Jagalúr.)

Central Group.—The rocks seen at *Holgera*, 7 miles south-west of Nanjangúd, are very gneissic in their general aspect, but they are very badly seen on the top of the ridge where the old workings are situated, and it is possible the hornblendic beds there occurring may belong to a very narrow strip of the auriferous schists (Dharwars), an outlier of them in fact, and probably faulted in along the strike of the underlying gneissic rocks. The

¹ Rocks of the same geological age as the auriferous rocks of Mysore occur largely in other parts of South India, both north, east, and south-west of Mysore, and to classify such a widely-developed system, it was necessary to have a collective name for them. The name of *Dharwar* rocks was therefore given by me to these rocks, on the usual principles of geological nomenclature, namely, for their having been first recognized as a separate system after the study of their representatives in the Collectorate of Dharwar (Bombay Presidency), where they occur very largely and typically, and underlie the important town of Dharwar. The use of this name in this report has, however, been deprecated on the plea that it might lead to confusion in the minds of readers unfamiliar with South Indian geography. I have therefore avoided using it wherever this was possible, but geologists who may peruse my report will understand that the alternative terms which I have used, "Auriferous" or "Schistose rock series," really mean formations of the Dharwar age.

quartz reefs here seen are small and coincide in direction with the north-to-south strike of the country rock, or deviate a little (3° - 5°) to the east-of-north. The quartz exposed in the principal old working is highly ferruginous, being full of scales and films of impure hæmatite (specular iron), but contains no pyrites or other sulphides. North of the old working the reef is cut off by a broad band of a highly decomposed granite rock containing much pink felspar. The country between Holgere and Mysore is composed of micaceous gneiss with a few bands of hornblendic schist and potstone, with no quartz reefs of any importance, and the small show of gold obtained by Mr. Lavelle from washings in the Kadkole nullahs must have come from veins too small in size to be worth mining. I could not trace any connection between the Holgere auriferous rocks and the great Chiknayakanhalli band, the former must therefore be considered as a mere small outlier, if they are really of Dharwar age. The line of high ground commencing on the north bank of the Kávéri river near *Shettihalli* consists mainly of quartzites and hornblendic schists belonging to the Dharwar series and forming a narrow band (from 2 to 3 miles in width), which extends northward, widening very gradually as it is followed up. A number of small quartz veins occurs running in the direction of the strike of the beds, here nearly due north and south. The quartz is very white and "hungry-looking," and very few minerals are to be found in it. Those noted were blackish-greenish mica and a white decomposing felspar, the former not infrequently in distinct six-sided prisms. These included minerals show but very rarely and at wide intervals, but here and there become numerous and convert the vein into a true granite, a rock in which gold very rarely occurs in any quantity. Fragments of good-looking blue quartz were noticed scattered about the surface to the south-west of Siddapur village, but on tracing them up to their true source they were found to be derived from typical granite veins. As far as surface indications go, this tract appears a very unpromising one, and quite undeserving of consideration when so many really promising tracts remain as yet unprospected. The course of the extension of the Chiknayakanhalli schist band south of the Kávéri is yet undetermined, but as seen from the top of the Karigaṭṭa Trigonometrical Station, it appears to go southward, passing east of the granitoid mass of Chámundi hill; unfortunately want of time prevented my determining this point, which is one of considerable interest geologically. *Honnabetta* is a hill lying a mile and a half south by west of Nágamangala, and forming the central part of an outlier of the auriferous series on the western side of the Chiknayakanhalli band. The mass of the hill consists of hornblendic schist overlaid by chloritic schists. A washing made in the small nullah draining the northeast face of the hill just within the eastern boundary of the auriferous rocks gave a good show of gold of medium size and excellent colour. I noted one large bluish quartz reef on the high north spur of the hill which struck me as worthy of being tested in depth. At present merely the back of the lode is exposed, and but to a very small depth, so it is impossible to test the real quality of the stone. This reef runs through the chloritic schists. *Girigudda* forms the northern extremity of the outlier, and shows chloritic

and hornblendic schists, extensions of the Honnabetta beds. The ridge of the Giriguḍḍa is traversed by a pale green dioritic (?) trap. The north end of the outlier dies away rapidly northward of Giriguḍḍa, and disappears northward of the nullah. A careful washing in the small stream draining the east side of Giriguḍḍa, at a spot about a quarter of a mile eastward of the hill, gave a fair show of medium fine gold. The presence of trap rock among the schists is a favourable indication for the presence of gold. The whole outlier, which extends 7 miles from Giriguḍḍa southward to Maradipur, with a width of a little more than a mile across Honnabetta hill, is deserving of very close examination, and the reefs of being prospected to some depth. About 2 miles north of Giriguḍḍa and within the gneissic area lies *Hulmandibetta*, a low hill on the ridge of which occur several fine reefs which are being tested in depth by the Mysore Concessions Gold Company. The question—Are the quartz reefs occurring in the gneissic rock profitably auriferous as well as those occurring in the Dharwar series? (to which all the important gold-yielding reefs at present known unquestionably belong)—will doubtless ere long receive a definite answer from the results of these deep prospectings, and I sincerely trust it will be a very favourable one, as, if so, many other reefs of great size and beauty running through the gneissic series may probably also prove to be gold-yielding. Much of the quartz turned out at Hulmandibetta is good-looking, bluish in colour, contains some pyrites, and encourages the hope that it will prove auriferous at depths not reached by superficial weather action. *Haltibetta*, a large hill some three miles north of Nágamangala, has been reported auriferous, but the statement is highly improbable, the whole mass of the hill except the southernmost extremity consisting of granitic gneiss. A band of schistose rock extends from the southern spurs southward for a couple of miles till hidden by the alluvium of the Nágamangala stream. Large reefs of quartz were noted on either side of Haltibetta; they are very unpromising, the quartz being very white and free from included minerals. In miners' parlance, they are very hungry-looking. At *Kalinganhalli* the old native workings occupy a considerable area on which old dumps stood thickly, showing that a large amount of washing had been done. A very good show of gold was obtained by washing the dumps, but no reefs, large enough to be worth mining, could be found. Further south, however, fine reefs are to be seen pretty numerous, running north and south in the strike of the chloritic schists.¹ A narrow strip of very typical auriferous schists crosses the road a mile and a half west of the bridge over the Shimsha on the Hassan-Bangalore road, and may be seen stretching away north and south to a considerable distance, a strongly-marked bed of jaspery hæmatite quartzite forming a distinct ridge. This strip of schists is faulted against the gneiss along its eastern boundary about half a mile to the east. The northern extension of the schists crosses the Shimsha and is lost sight of in the broken ground east of the river, but the southern extension can be traced to the high ground north of Ankanhalli.

¹ The strike of the schistose beds here tends considerably eastward, and they appear to extend towards Kunigal, instead of running nearly due south down to Nágamangala, as I had formerly assumed on imperfect information.

South of Ankanhalli the highly characteristic hæmatite band reappears and forms a marked feature, continuing for several miles till almost abreast of the Narasimhaswami pagoda hill. The western boundary of this band of Dharwars is in all probability also a faulted one, several hundred feet in thickness of chloritic and hornblendic schists lying between the hæmatite bed and the gneiss near Nalkundi, while to the north, where the hæmatite bed crosses the Bangalore road ($1\frac{1}{2}$ miles west of the Yediyur bridge), it shows close up to the gneiss. The schistose rocks appear to spread out over a considerable area eastward of the Narasimhaswami hills, and may very likely reach as far as the line of granite-gneiss hills east of the Shimsha. A line of considerable hills, showing all the characteristics of the auriferous series, is seen to stretch southward for many miles some little distance west of Kunigal. These rocks, if really belonging to the auriferous series, represent the beds deflected eastward or south-eastward near Kadaba, and as such are worth examination. The old workings on *Honnebagi* hill, near Chiknayakanhalli, lie a few yards down the eastern slope and just within the boundary of the auriferous schist area, the crest of the ridge being formed by gneiss on which rests the basement bed of the schist series, which is here a quartzite. The old workings, which consist only of small shallow pits surrounded by dumps, extend southward for nearly a mile along the watershed, and at the south end of the area they occupy have followed some east and west reefs across the boundary into the gneissic area. The reefs are white and "hungry-looking," and the old miners seem to have found no great encouragement, for they have made no extensive excavations. The principal reef on Honnebagi hill runs N. 15° - 20° W., but trends southward; at the south end of the ridge it is about 5 feet thick. Overlying the basement quartzite on Honnebagi hill comes a series of schists, hornblendic, chloritic and micaceous, which occupy the space up to the foot of the hills, where they are overlaid by argillites and a great thickness of hæmatitic schists, locally very rich in iron, and giving rise to the formation of sub-aerial breccias which assume a lateritic appearance from the action of percolating rain-water. Quartz reefs of rather more promising appearance than those on Honnebagi hill occur here and there in the schists, and are probably the source of the gold obtained from the streams draining this tract. A set of washings made by me near the north-east end of Honnebagi hill in the main nullah and its branches gave very fair shows of medium fine gold of excellent colour. Tests by crushing and washing quartz from two of the trial-pits recently sunk on Honnebagi hill gave no show, but this is not conclusive, the quartz being from too small a depth and the quantity of quartz to be treated by hand-crushing being necessarily insufficient for a reliable test. The reefs at *Kadekalgudda*, $2\frac{1}{2}$ miles N.N.E. of Chiknayakanhalli, like those at Honnebagi, all lie within the schistose area though very near the boundary, and like them run in the strike of the country rock, which is here very nearly north-west-by-north. The quartz is white in colour, but a good deal iron-shot along the lines of fracture. I could find no enclosed minerals except a little chlorite and obtained no show from crushings, but a careful washing made in the stream draining the north-west end of Kade-

kalgudda gave a fair show of rather fine gold. On the slope of the hill above the great reef just mentioned are chlorite schists and an associated flow of dioritic trap, both favourable to the presence of gold, and other reefs of better quality may very likely be hidden under the talus which covers the slope very generally. A washing of material collected in the nullah draining the north-east side of Kadekalgudda gave no results. A washing of the alluvial deposit on the banks of the nullah draining the eastern side of the main ridge east of Chiknayakanhalli, close to the Dodrampur temple, gave but a poor show of gold; this, however, is not surprising, as the east flank of the range shows but very few quartz reefs of any size; the country is almost entirely formed of grey crystalline limestones with very numerous siliceous partings in the form of quartzite, which here and there attain to the magnitude of distinct beds. The limestones are much contorted, so their true thickness will be hard to ascertain by measurement, but they are certainly several hundred feet in thickness, and cover a large area stretching away to the south-east. A small show of similar limestones shows on the western side of the range just opposite the mouth of the gorge east of Ballenhalli which cuts so deeply into the hills. The range here unquestionably forms a synclinal fold, the axis of which corresponds with the crest of the range. To the north the limestones are replaced by schists and argillites as above mentioned, while to the south the tract at foot of the range is so thickly covered with deep red soil derived from decomposition of the hæmatitic schists on the summit of the ridge that the low-lying schists are completely obscured, for the red soil, which contains local conglomerate and breccia beds, is not cut through by the streams now flowing westward from the hills. A washing which I had made in the nullah south of Sondenhalli gave a small show of gold.

A great gap intervenes between the Chiknayakanhalli gold-field and the next metalliferous locality in the central group—Belligudda copper mine, close to Chitaldroog. The intervening area is geologically a *terra incognita*, in which a geological survey would assuredly find mineral tracts of importance. *Belligudda* is a fine hill lying some 5 miles south-east of Chitaldroog, on the western flank of which are four large open pits and several small shafts and short galleries sunk in clay schist in order to extract copper ore, which occurred there in the form of malachite or green carbonate. From the nature of the workings the ore appears to have occurred in pockets, not in a regular lode, and the pockets to have been worked out bodily, nothing remaining but thin films of a very poor earthy form of the carbonate deposited in the joints and cracks of the schists. A few fragments of quartz with small particles of rich malachite were picked out of the atle tipped down the very steep side of the hill, but no trace of any other ore or metal could be discovered after very careful search. *Kotemaradi* and *Gudda Rangavvanhalli* are two auriferous localities at the south-east and north-east extremities, respectively, of a tract of schistose rocks lying between 3 and 4 miles north of Chitaldroog. The country rock is varied, consisting of dark chloritic schists overlaid by beds of quartzite, and these again by various schists. Quartz reefs are rare, or else covered up by the extensive

talus, but the washings made were very successful and yielded gold in relatively large quantity and excellent quality. Taking all things into consideration, this tract is one of the most promising I have seen. The quantity of gold obtained was so good that the country north-west and north of the little Kotemaradi, and again to the north-east of Guddarangavvanhalli deserves to be most closely tested by costeaning and deep prospecting. The nature of the country rock, chlorite-schist with associated diorites, is all that can be desired, and there are no ostensible difficulties of a nature likely to hinder the opening up of mines, should rich reefs be discovered on further prospecting. About 14 miles north of Guddarangavvanhalli lies the small hill known as *Honnamaradi*, to the west and south-west of which are several fine reefs and numerous small veins of quartz cropping up through the soil which hides the country rock. The hill consists of a drab or yellowish gritty schist, passing into argillite in parts. Immediately east of the hill is an outcrop of gneiss, the eastern extension of which is masked by a great spread of cotton soil. The dip of the schists is easterly, but at a very high angle, and the two rock series are separated by a fault boundary. A careful washing in the little gully which drains the south and west sides of the hill gave a very fine show of coarse gold, which can only have come from a very little distance and is doubtless derived from one or more of the reefs above referred to. The gully which flows round the eastern side of the hill cuts some 12 to 15 feet into the decomposing gneiss, and has exposed several small reefs of very blue quartz. This spot had evidently been a favourite place of resort of the Jalagars in olden times, for two very large dumps are to be seen on the western bank of the gully. A washing of material collected in the bottom and banks of the gully gave a very fair show of fine gold; this may, however, have come from reefs lying within the schist area, as the gully rises within it on the north side of the hill. With regard to this gold-yielding locality, I quite agree with Mr. Lavelle that it is one of very great promise. Honnamaradi is the most northerly auriferous locality at present known in the Chiknayakanhalli band, which continues its north-north-westerly course for a few miles beyond Jagalur, and then crosses the frontier into the Bellary District. The Chiknayakanhalli schist band sends off a north-westerly branch some 6 or 7 miles south-west of Chitaldroog. This branch also continues its course into the Bellary country, and passes close east of the well-known Uchchangi-droog, a very conspicuous granite-gneiss hill crowned by a large fort. Several groups of hills rise out of this band, one of them occurring to the north of the high road leading from Chitaldroog to Davangere. At the north end of this latter group lies the village of Halekal, after which this end of the hills is called the Halekalgudda, and between it and the village lies the auriferous locality known by the same name. The *Halekalgudda* hills consist of thick and gritty, locally conglomeratic quartzites, with siliceous, micaceous and chloritic schists. No reef or veins show on the northern slope above the gold-washing place, but an area of several acres shows very numerous old dumps, showing that the surface soil had been largely turned over. The washing made here gave a good show of

moderately coarse gold. Some fine large good-looking reefs, running in the strike of the rock, occur, crossing the footpath which leads from Halekal to Gummanur, 3 miles south-west-by-south. West of these is a great flow of dioritic trap intercalated between the upper and lower schists. Though not so promising as Kotemaradi and Honnamaradi, Halekalgudda is yet deserving of the closest investigation.

(*Mysore to Banavar.*)

West-Central Group. — As already stated, the auriferous localities included in this group occur all in small detached strips or patches of schistose rock scattered over the older gneissic series. They are really remnants of the once apparently continuous spread of schistose (Dharwar) rocks which covered great part of the southern half of the Peninsula. After this great series of rocks had been deposited, the crust of the earth on which they rested underwent tremendous lateral pressure, and they were crumpled into a series of great foldings running up and down the Peninsula in parallel directions. After this they were exposed to tremendous erosive forces and in parts entirely worn away, and the underlying old gneissic rocks again laid bare. The small outliers are then nothing more than little patches and strips of the younger schists which have escaped erosion either from the superior durability of the rocks composing them, or from their having been let down by fractures of the earth's crust, technically known as faults, to a lower level than surrounding parts of the gneiss, and thus escaped in some measure the full action of the eroding agencies, whatever they may have been. The most southerly of these outliers in this group is the little gold-field of *Sonnahalli*, 18 miles south-west of Mysore. The shape of this auriferous tract is roughly a narrow oval, forming the flattish top of a low rise running north and south. The workings extend for about $2\frac{1}{2}$ miles north and south. I estimated the length of the oval at 3 miles, but this may possibly be an under-estimate, as the country is much obscured by low jungle, especially to the south and east. The country rock consists of chloritic and other schists overlying very trappoid hornblendic rock. The old workings are numerous but none of very great size, and all seem of great age, judging by the highly-weathered condition of the rocks exposed in their sides. All of them are much overgrown by jungle, and one has to cut one's way through a dense tangle to get right into them. The shape of the working appears in every case to have been due to the run of the reefs worked upon. These reefs very probably contained visible gold, which induced the old miners to take out all the quartz they could raise, leaving only here and there masses which they considered unproductive or, in a few cases, too large and massive to be dealt with conveniently. In many cases, both here and elsewhere, the whole lode has been removed as far as can be seen, and the nature of the lode can only be guessed at from fragments of quartz left behind, and it is at present impossible to form any opinion about the value of the property. If the old pits were completely cleared out, the lode would in most cases be rediscovered and could then be properly tested in depth.

Scrapings of the sides of all the principal workings south of Sonnahalli were washed and gave at best but very small shows of gold. Half a mile east of Sonnahalli village, a very large reef is exposed on the top of the ridge; it does not look very promising, but seems worth deeper prospecting than it has yet undergone. I did not attempt a crushing, as I could not find any good-looking stone from a sufficient depth. This reef has a run of N. 5° W. At the foot of the north-eastern slope of the Sonnahalli betta or hill, a large reef has been exposed and to some extent worked out by a series of pits of moderate size. The quartz is white and barren-looking. The line of old workings at *Karimaddanhalli* commences about 1½ miles east of Sonnahalli betta, and extends northward for about a mile. They have been sunk in pale pink gneissic-looking feldspathic schists, but associated with them are some hornblendic and ferruginous strata which bear a fair resemblance to characteristic members of the auriferous schist series, and they may, provisionally at least, be regarded as belonging to it. They form a narrow strip about 2 miles in length on the flat top of a ridge east of Karimaddanhalli village. The rock forming the casing of the reefs is generally chloritic near the contact, but not so at the distance of a yard or two. In the most southerly working the reef is not seen in the pit at present and seems to have been entirely removed, but this cannot be decided unless the pit were entirely cleared of jungle and débris. Fragments of quartz remaining are white but much iron-stained, and contain a few scattered small cubes of pyrites. The great working east of Karimaddanhalli village has been excavated along the course of a large reef running very nearly due east and west. In colour this reef is very white, but parts are much iron-stained, and it contains many cavities both cubical and irregular in shape, the latter containing a decomposed chloritic mineral and limonite. A few cubes of pyrites were noticed and some specks of arsenical pyrites. About ½ mile to the northward of the great working commences a line of smaller old works which extend right down to the south end of the Gijayanvaddargudi tank, a good mile to the north. Many reefs are exposed running in various directions north, south, east, west, north-east, south-west, &c. &c., and all are white and hungry-looking, and include hardly any accessory minerals, small chloritic and hæmatitic inclusions excepted. Some of the reefs are large, from 6' to 8' or 10' thick. The country rock here consists of hornblendic and chloritic schists, the latter in very small quantity. Many washings were made and gold obtained in nearly every case, but only in small quantity. Not a vestige of free gold was seen in any of the reefs, either here or anywhere else. If it existed, the old miners were very careful to remove every atom of the gold-bearing quartz. About ¾ of a mile north-east-by-east of *Nadapanhalli* is a line of old workings of limited extent, sunk in pale greenish-brown chloritic schist. From the southern working, a fair-sized pit, the whole of the reef has been removed. In the more northerly workings, some shallow pits and a long shallow trench, a good-sized quartz reef is exposed to the depth (at present) of 3 or 4 feet at the utmost. The quartz is white, but shows a fair number of cavities filled with earthy limonite, probably derived from the decompo-

sition of enclosures of chloritic minerals. Pyrites is very rare, occurring only in very minute cubes or specks. Bright spangles and films of red hæmatite are common. Several washings were made from scrapings of the pit sides, and in each case resulted in a small show of rich-coloured gold. This concludes the survey of this group south of the Kávéri.

The well-known *Bellibetta* and its environs contain a considerable number of large and well-defined reefs, to which a large amount of attention had been paid by the old native miners. *Bellibetta*, or the silver hill, is the highest of a group of moderate-sized hills rising on an outlier of the auriferous series, rather more than 20 miles N.W. of Seringapatam, and $3\frac{1}{2}$ S.W. of Krishnarájpét. The principal old workings are situated on the northern spur of *Bellibetta*, and consist of several large pits and a variety of smaller ones, with several small shafts and passages. Some are a good deal obstructed by jungle growth and all to a great extent choked up with débris, which makes it quite impossible to be certain as to the depth they were carried to. Dumps are numerous but not proportionate in extent to the size of the workings, so it is probable that much of the auriferous quartz was carried away to be reduced to powder elsewhere. The mass of *Bellibetta* consists of chloritic schist, the beds of which dip westward at a high angle, the strike being slightly west-of-north. They show considerable contortion. They are underlaid to the east by a bed of very coarse steatitic schist, on which the village of Katargatta stands. The run of the majority of the reefs is a little west-of-north, but one or two run east and west. To the south-west of Katargatta village is a very large reef of pale blue and white quartz which extends north-westward up to the slope and appears to join the set of reefs on top of the northern spur of *Bellibetta* in which the great workings have been carried on, but a considerable space between them is covered up by débris and talus at present and the connection cannot be proved positively. No workings have been made along the lower part of this great reef, but to the south and south-west of it I noticed a large number of small workings and dumps. A not very important series of old shallow works with dumps occurs on the ridge north of *Bellibetta*, and here washings gave a very poor show of gold. A large and well-marked reef forms the crest of this ridge, but it is very white and hungry-looking and contains no enclosures but a very little chlorite. The country rock is a curiously felted fibrous hornblende schist, with a small admixture of chlorite. A few hundred yards to the south-west, in the jungle on the left bank of the stream flowing into the little Katargatta tank, a bare sheet of very light-coloured rocks, apparently a quartzite, is exposed, on which are many score of small saucer-shaped holes, evidently made by pounding the quartz to reduce it. None of the "mullers" or hammers used in the process were found here. Half a mile north of Katargatta village lie some important quartz reefs and a large number of old workings. The reefs form the edge of a ledge formed by the eastern ridge of the auriferous rocks, *Bellibetta* being the western ridge rising out of the outlier. The reefs, which are very large and well-marked, consist of pale blue and bluish-white quartz. I saw no indications of any recent deep prospecting along these reefs, the eastern of which is exposed for nearly a mile and the western for about $\frac{1}{4}$

mile. About $\frac{3}{4}$ of a mile to the northward of these great reefs is a line of old workings. They are mostly large trenches, so greatly filled up with soil and grass that no signs of any reef can be made out. They present every appearance of great age. The country rock is also almost entirely masked by soil and vegetation; when seen, it consisted of a talcose hornblende schist. Very little quartz is seen lying about, and it looks as if the lodes had been extracted bodily. I cannot confirm Mr. Lavelle's asserted discovery of silver ore on Bellibetta, having been unable to find any sort or kind of argentiferous mineral there; still there can be no doubt that it is a gold-field of very great promise and deserving of the closest examination by deep prospecting on an ample scale. The great reef on Bellibetta, if proved sufficiently auriferous, could easily be mined to considerable depth by simple quarrying, and for this reason among others I think Dewan Purniah's want of success in mining for silver here was due to the want of ore rather than any other cause. Very near the northern extremity of the Bellibetta outlier is a small group of small shallow pits and dumps. They lie on both sides of the Mysore-Hassan road, about $\frac{3}{4}$ of a mile north-west of *Pura*. Two small reefs were noted, but neither of them looked promising, they being white and hungry. The country rock east of the road is a remarkable hornblende schist, which shows a very pretty felting of the fibre in stellate points with curved radiations. North of the Bellibetta outlier comes a tract of micaceous granite-gneiss, with some hornblende schist bands and occasional trap-dykes extending up to and beyond the famous Jain temple of S'ravan Belgola, and some four miles further north-east, where what appears to be a tiny outlier of the auriferous rocks shows close to the little village of Kempinkote in Channarayapatna taluq. The *Kempinkote* workings consist of one huge pit close to the village, a small pit about 300 yards to the south-east, and three or four small shallow excavations a mile to the north-east. The great pit, which is by far the largest excavation of the kind I have seen in India, is dug out of hornblendic and steatitic schists, a good deal contorted but having a general strike to the northward. Not a trace of any reef is visible *in situ*, and but very few lumps of quartz remain in the pit. This may very likely be explicable by the fact that it contained free gold, and that every good-looking bit was carried off long ago to be crushed elsewhere. I examined every bit of quartz I could see, but had not the good fortune to find any free gold. A washing of the scrapings of the side near a small exposure of the steatitic schist gave a very rich show of gold in proportion to the quantity of stuff washed. The gold was very fine-grained and of excellent colour. A washing at the small pit to the south-east gave a very poor result. The country rock here is also a steatitic schist very similar to that of the big pit. A few small lenticular masses of bluish-white quartz occur on the east side of the second pit, but are too short to be regarded as true reefs. The small excavations lying to the north-east of Kempinkote have been made in chloritic schist abounding with small cubical cavities full of reddish limonite. It is impossible to offer any positive opinion as to the Kempinkote gold prospects, no reef being visible in the

great pit. The latter should be cleared out to see whether the reef has been entirely worked out or not. The length and width of the great pit is so great that it is quite possible the old miners really descended to a great depth before stopped by water or other difficulties they could not compass with their limited mechanical appliances. The great size of the old working shows, however, that the old miners found the place worth their attention for a long period. Overlying the chloritic schist which forms the main mass of the low rise south-east of *Nuggihalli* is a thin bed of hæmatitic schist, the débris from which forms a wide-spread talus. This iron-strewn knoll appears to be the southern termination of the Tagadurbetta outlier, unless the auriferous rocks make a considerable sweep to the west, for the rocks along the direct path from Kempinkote to Nuggihalli belong to the gneiss. To the northward the hæmatite band thickens considerably, and may be traced for nearly a mile, and may very likely represent the great iron beds which form the crest of Tagadurbetta itself. The rock shown in the quarry about $1\frac{3}{4}$ miles N.N.E. of Nuggihalli is of doubtful geological age, and is separated from the Tagadurbetta band of the auriferous schists by a band nearly 2 miles in width of granite gneiss. The workings described by Mr. Lavelle as occurring one mile north of the village, were not seen by me, nor are any indications of them given on his maps. Two pits I was taken to at about $\frac{1}{2}$ to $\frac{2}{3}$ of a mile W. and N.W. by W. of Nuggihalli, appear to me to have been quarries for rubble stone, not excavations made for any mining purposes, for no signs appear either of reefs or dumps in either case. They are situated just within the western boundary of the schist outlier, and lie near the path leading from Nuggihalli to Virupákshipur. A mile and a quarter N.N.W., and just at the head of the valley running north-east from the *Tagadurbetta* hill, begins a set of old workings which occur at intervals through the scrub jungle for rather more than half a mile. The workings are all very shallow and look as if they had been early abandoned. The reefs seen run in the strike of the country rock, which bends about from north and south to north-west and back to north again. None of the reefs here are of any length or great thickness. The quartz they consist of is white and hungry-looking, and the washings obtained were not encouraging in quantity, though not so small as to make me condemn this gold-field as unworthy of further attention, for the country rock, chloritic schists with intercalated hæmatitic bands, is favourable to the occurrence of gold. The crest of Tagadurbetta consists of two good-sized beds of massive hæmatitic rock, which are one source of the great hæmatitic talus which covers the eastern slope of the ridge. The southern extension of these beds is very soon masked by surface deposits, but to the north they extend about a mile as low but conspicuous mural outcrops. How much further they extend I could not say, but it is not all improbable they may run considerably further, or even join the *Mallenhalli* outlier, 8 miles to the N.N.W. These workings lie a mile south of the high road leading from Hassan to Tiptur, and about 10 miles south-west of the latter town. No reef is seen in connection with the large pit, nor is the country rock exposed just here, but close by it consists of hornblendic schist underlying a green micaceous gneissoid schist,

and fragments of true quartzite were observed lying about in some quantity, confirming the Dharwar age of these beds. A moderate show of gold was obtained by washing. A little to the northward of the pit is a large reef of rather good-looking bluish-white mottled quartz. The reef shows for nearly 100 yards, and is from 12 to 15 feet thick on the surface. The quartz shows no included minerals, but testing in depth might very probably show good results. The schistose rocks seem to stop near Mallenhalli, and only gneissic rocks were noted between the village and the next auriferous locality, *Jalgaranhalli*, $3\frac{1}{2}$ miles N.W. by N. This consists of a small and rather shallow pit with a number of date-palms growing in and around it. No reef is seen traversing the pit, on the east side of which is an outcrop of the stellately felted hornblende rock seen at the Pura workings at the north end of the Bellibetta outlier. A wash of scrapings from the side of the pit gave a fair show of fine gold, sufficient to recommend that it be more fully prospected and tested than has as yet been done. The *Belgumba* auriferous rocks are, I believe, the northerly extension of the beds seen at Jalgaranhalli, but time did not allow of my examining the intermediate tract of country, and I visited the Belgumba tract from the north. This group of old workings lies 7 miles south-east of Arsikere, and $1\frac{3}{4}$ miles south of the 99th milestone on the Bangalore-Shimoga road. The highest point of ground due south of the 99th mile is the northern extremity of the Belgumba outlier of the auriferous rocks; the southern end, as above explained, forming to all appearance the Jalgaranhalli auriferous patch. The workings, with one exception, lie along the westerly slope of a low ridge extending S.S.E. from the high point¹ just referred to. The strike of the schist beds is as nearly as possible S.S.E., and they occupy a band about $\frac{1}{2}$ a mile in width abreast of the workings; further south the band seems to widen out. A large but generally white and hungry-looking reef runs along the ridge on its western slope just below the summit, and another similar one crests a knoll a little to the south of the most southerly pit. They run parallel with the strike of the chloritic and hornblendic schists forming the country rock. The northern reef shows bluish colour in parts. The considerable size of the old workings is the only evidence in favour of their having been productive. They are much obscured by rubbish, and in their present state it is impossible to say whether or not the reefs they were worked on continue in depth. The prospects of future success at this place are not very encouraging. The country northward from the Trigonometrical Station hill up to and beyond the Shimoga road is all gneissic. At *Gollarhalli*, about 6 miles to the south-west of Belgumba, is a very large old working, in shape like a very rude horse-shoe, opening northward. The depth of the working is nowhere great, and at the southern part of the curve very shallow. The curve encloses a few small detached workings of no interest or importance. Dumps occur pretty numerously all along the sides of the horse-shoe, but no reefs are visible in any part of the workings except at the southern apex, where a large but very ill-defined reef of bluish-white colour shows up for a few yards; but it is very easy to overlook it, as it is greatly obscured by rubbish. A

¹ This point is crowned by a Trigonometrical Station, 2,982 feet above sea-level.

very barren-looking reef of massive white quartz occurs some little distance north of the western branch of the horse-shoe. Neither of these reefs has been tested to any depth. This outlier of the auriferous rocks, if such rocks they are, is a very small one, and gneissic rocks occur all around at very small distances. Very little is seen of the country rock except at the eastern end of the works, where an immensely tough hornblende rock with a soapy steatitic weathered surface occurs. Small outcrops of hornblende schist peep up here and there in the workings. The washings that I had made at the western extremity gave only a small show of gold, but from scrapings in the deepest part of the eastern arm of the working I got a very fair show. The locality appears to me to be deserving of closer prospecting than it has yet undergone. Three and a half miles south-south-west of Arsikere are the old *Yellavari* workings, which lie in the low ground half a mile or so east of the village, and are excavated in hornblende schist with intercalated bands of chlorite schist, which I refer but doubtfully to the auriferous system. The quartz seen is bluish-greyish-white in colour, very saccharoid in texture, and much iron-stained in part from the decomposition of included specks of hæmatite. Specks of powdery kaolin occur, but no visible gold or any sulphides. The reef lies between bands of micaceous and hornblende bands of gneiss on the east and west respectively. A washing from the casing of the reef gave a very small show of gold. I feel justified in recommending further testings and a search for the reef, which will probably be re-discovered if the working is cleared out to the bottom. Whether there is any connection between the Yellavari and Gollarhalli patches of auriferous rock I cannot say; the country is too jungly, and the rocks at both places seen in such very small outcrops that the eye can only follow them for a few yards. I noted no sign of any extension of the schists northward or north-westward past Arsikere. *Karadihalli* is the last of the auriferous localities included in the west-central group. The workings lie on the north and south-east slopes of a low ridge, the centre of which is formed by a small granite gneiss hill, locally called the Chotnare Maradi, around the base of which lie beds of steatite and hornblende rock of doubtful age, geologically speaking. As to reefs, only one small one was noted near the southern set of pits, and this is a white and hungry-looking one running for some 60 paces N. 5° W. Northward of the Chotnare Maradi are two large reefs deserving of further examination. The first, which lies due north of the hill, runs north and south, the second, which shows much more conspicuously, lies a couple of hundred yards further north-east and runs N. 20° W. The great wealth in gold which Mr. Lavelle ascribes to this part of the country has, I think, yet to be proven. The auriferous tracts already known are very small in extent, and, as far as surface study of them goes, they do not appear to be of the highest class.

(*Tarikere to Dāvāngere*)

Western Group.—No old workings or unworked auriferous localities were brought to my notice in the southern part of the western band, but since

the completion of my tour I have seen a statement¹ that a vast number of old workings occur all over the hills to the north-west of Halebid. These old workings should certainly be looked up, both on geological and economic grounds. The western group is numerically far poorer in auriferous localities than either of the others, and they are scattered widely apart. The sands of several of the small streams running down from the hills west of the village of *Chiranhalli* in Tarikere taluq are auriferous. A washing in the stream flowing through the little tank known as the Huggisiddankatte gave a good show of rather coarse gold. A very fair show was next obtained at the junction of the same stream with another coming in from the north, and a small show from the bed of the northern stream, which is crossed by a good-sized quartz reef running N.N.E. This was the only reef seen, but other reefs doubtless occur among the hills west of the Huggisiddankatte. The country rock consists of steatitic and very pale chloritic schists, full of cubical crystals of pyrites, some of which are replaced by pseudomorphs in limonite, and others are quite fresh and bright. Well-shaped octohedra of magnetic iron are also to be found in the schists. The geological features are all favourable to the occurrence of gold, and the locality is worthy of very careful prospecting. At *Malebennur*, the sands of the little stream which falls into the Komaranhalli tank next beyond the ridge underlying the south end of the tank bund are auriferous, and from a washing I made here I obtained a very good show of coarse-grained gold of excellent colour. The little stream drains the western slope of the ridge for about a quarter of a mile, and its whole catchment basin must be less than 100 acres. The greater part of this consists of chloritic schists which in their upper part contain many laminæ and small nests of crystalline limestone. The chloritic schists are underlaid by trap, to all appearance a contemporaneous flow. This trap extends westward far beyond the basin of the small stream. To the east the chlorite schist is overlaid by a hæmatitic quartzite bed of considerable thickness, beyond which I did not follow up the series. No reefs are to be seen within the basin of the little stream, but many small veins of blue quartz occur traversing the chlorite schist and also the overlying hæmatite bed. Some of the larger of these veins on top of the ridge have an east-to-west run. The western slope ought to be very closely tested by costeaning in order to ascertain the source of the gold dust found in the stream. Trenches carried through the talus-covered parts of the slope may also be tried in order to find, if possible, any larger reefs. As already stated, a trap formation occupies the bottom of the valley west of the auriferous stream. This trap is much obscured by soil and talus, and the sequence of the rocks is not to be made out near the road. Where the ground begins to rise westward, and rocks crop out, is a quartzite so much altered by crushing and weathering that it has in parts assumed quite a gneissoid appearance. Underlying this comes a thick band of dark schist, chiefly argillitic, and this in its turn is underlaid by a great thickness of pale green and grey schists, chlorito-micaceous, in variable character. A few

¹ In an exhaustive work on the Occurrence and Extraction of Gold, by A. G. Lock.

beds of quartzite are intercalated here and there, and many very irregular veins of white and pale bluish quartz are to be seen traversing the schists. Gold occurs at *Anekonda*, a little over half a mile N.E. of *Davangere* travellers' bungalow, in form of dust obtained by washing the red gritty soil lying against the rock, which here forms a ridge rising only 20 feet (if as much) over the surrounding country. The rock is a brecciated quartz run, not an ordinary reef. Runs such as these are common in many parts of the gneiss in the Ceded Districts and elsewhere, but I have never met with one within the auriferous (Dharwar) series, nor have I ever come across such a brecciated quartz rock that had been regarded as auriferous by the old miners and mined as such. A washing of the red soil exposed in the shallow bed of a small stream falling into the *Anekonda* tank, a few hundred yards further south, also yielded a small show of gold. The source of this gold I believe to lie in the high ground to the south.

The elevated tract of the auriferous rocks of which the Bababudan mountains form the centre is one well deserving great attention both from the geologist and the mining prospector, it being an area of great disturbance, the rocks being greatly contorted on a large scale, and on the north and south sides at least of the area much cut up by great faults. Regions of great disturbance are in many cases extra rich in minerals, and it is very likely that such may be the case here. It is only of late years, owing to the extension of coffee-planting, that this mountain region has become accessible. Before that it was covered by vast impenetrable forests which hid everything. These are now penetrable in many directions, and the modern prospector has opportunities which did not exist before. The eastern part of the mountain tract culminating in the Bababudan mountains consists of huge flows of trap-rock (diorite) with intercalated beds of dark argillitic schists capped by quartzites and hæmatites, which two latter form the summit of the Bababudan mass. Mr. Lavelle mentions magnetic iron ore and "chrome" (presumably chromic iron) from the Bababudans, but unfortunately does not give any localities, so it was impossible to inquire further into their occurrence. The chromic iron would be valuable if found in good quantity and easily mined. The most southerly of the auriferous localities in the western set is *Suladamaradi*, a small hill 2 miles south-east of Tarikere. The hill consists of chloritic schist in highly contorted beds. The great white reef on top of the hill participates in the contortions, and is bent into a very remarkable flat sigmoid curve. This and the other reefs occurring on the north side of the hill are very white and hungry-looking. The only enclosures in the quartz I noted, after careful search, were small spangles with rich green chlorite. There were no sulphides, nor any other mineral, the chlorite excepted. The indications of the *Suladamaradi* rocks are anything but favourable, and the old miners evidently thought so too, for there are no signs of old workings. On the left bank of the Bhadra river, 13 miles south-east of Shimoga, on washing in the rain gully draining the south side of *Honnehatti* hill (Trig. Station), I obtained a very good show of moderately coarse gold. The mass of the hill consists of chloritic schist having a N.N.W. strike, and the beds may be seen extending for

miles in that direction, after which they trend N.E. Several large reefs are to be seen running N.N.W., or in the line of the strike of the country rock. Their only apparent fault is their great whiteness. No workings are seen on the south side of the hill, but on ascending the Honnehattimaradi on its eastern side, I came upon several unknown old pits and one shaft, which from their bearing had evidently been sunk to follow one of the reefs. The workings had evidently been continued to some depth, and were therefore in all probability fairly remunerative. Honnehatti appears to me to deserve very marked attention from earnest prospectors. *Palavanhalli* :—This well-known auriferous tract, which with the adjacent Kudrikonda tract constitutes the Honnali gold-field, was first visited by me in 1881 and its geology very carefully worked out and reported on (see above, p. 41). My opinion of the *Kudrikonda* tract was published in the paper just referred to. I believe my geological inferences to have been correct, and that the temporary non-success of the mine has been due mainly to want of capital wherewith to push on the works in depth. So long as sufficient quartz was raised to keep the stamps at full work, the mine paid its expenses. Should more capital be raised and working be resumed, I fully expect the yield of gold will improve in depth, as has been the case in so many deep mines in Australia. Without having the plans to refer to, and the mine itself being full of water owing to the stoppage of the works, and therefore inaccessible, I could not form any opinion as to the merits or demerits of the plan of work which had prevailed, but I cannot help thinking that if a new engine of sufficient power be provided to keep the mastery over the great volume of water flowing through the mine, it will soon be possible to sink an exploratory shaft to find the lode, which has been thrown by a fault in the country rock. It would be a great mistake to abandon further work without having made an earnest search for the missing lode, as from the structure of the country it is very unlikely that the throw of the fault can be a great one.

Non-Metallic Minerals.

The pure gold-prospecting work left me no leisure to devote to any non-metallic minerals, excepting such as actually fell in my way.

Emery.—Near Nadapanhalli a few small masses of dirty brown rock, measuring less than 2 cubic yards in the aggregate, are seen by the side of a field road. There are no signs of any working, so I suppose only loose pieces were taken away to test its commercial value, which cannot be great. The emery is very impure and of poor quality, and with good corundum obtainable in quantity in various other parts of the country is not deserving of any attention.

Asbestos.—Only one asbestos-yielding locality came under my notice, to the west of Bellibeṭṭa. The matrix rock in which the asbestos really occurs is not seen in the little pit from which the stone had been dug. The surface of the country just here consists of reddish kankar underlying red soil. The asbestos I saw had been included in the kankar, having apparently been weathered out from its original matrix, whatever that may have been. The

show of asbestos at the pit was very small and of inferior quality. The largest pieces showed a coarse fibre, 4 to 5 inches long, cream-coloured, and of dull lustre. I only noticed one piece with fine silky fibre and silvery-white colour. In the present condition of the pit, it is impossible to form an opinion as to the capabilities of the place.

Kaolin.—Kaolin is mentioned by Mr. Lavelle as occurring in several places and of good quality and colour, but he does not state whether it is available in large quantities. To be of real value commercially it must be of the highest degree of purity and free from all iron-mould or stain. To raise it on a large scale requires the presence on the spot of a large supply of *perfectly limpid water*, with which to work the rock by hydraulic sluicing, and facilities for the construction of large settling pits, which must be protected from the influence of ferruginous dust of any kind. In Europe, china clay works are found to pay only where the industry can be carried out on a really large scale. I have never yet seen in India a place combining the two most essential requirements for a successful industry, namely, a large development of kaolinized granite and a sufficient supply of limpid water. The limpidity of the water is a *sine qua non* for success. There is no demand for large quantities of kaolin in India, and speculators would do well to make sure before starting such an industry in India that they could find a profitable market for their produce in Europe or elsewhere.

Marble.—I noticed a good bed of grey crystalline limestone running north and south across one of the gullies near the main gold pit at Holgere. The limestone lies half way down the slope to the Holgere tank, and is of good quality, and would be a useful stone for decorative and monumental sculpture. Immense quantities of grey crystalline limestone, divided by partings and small beds of quartzite, occur on the east side of the main ridge lying between Chiknayakanhalli and Dod-Rampura. The limestones are several hundred feet thick and deserve to be prospected, for they may very likely contain beds of other colour than grey which would be valuable in sculpture.

Granite.—A very beautiful variety of granite gneiss, eminently fitted for cutting and polishing on a large scale, forms the mass of Chotnaremaradi in the little Karadihalli gold-field, two miles east of Banavar. The rock is remarkably free from joints, and monoliths of great size could easily be quarried. It is by far the handsomest granite I have seen in Mysore.

Porphyry.—A great dyke of beautiful porphyry traverses the hills east of the Karigatta temple overlooking Seringapatam. The porphyry, which is of warm brown or chocolate colour, includes many crystals of lighter coloured felspar and dark crystals of hornblende. The stone would take a very high polish, and for decorative purposes of high class, such as vases, panels and bases for busts and tazzas, etc., it is unequalled in South India, and deserving of all attention. If well polished it fully equals many of the highly prized antique porphyries. The dyke is of great thickness and runs for fully a mile, so is practically inexhaustible. Blocks of very large size could be raised, and, from the situation of the dyke on the sides of two steep hills, it would be very easy to open up large quarries if needful.

METEOROLOGY

The Hindus divide the year into six seasons. Of these the first, *vāsanta ʔitu* or spring, commences with the opening of the Hindu year in March. It is the season of love and pleasure, and is a favourite theme of Indian bards. The weather is serene and clear, the farmer's occupations are mostly over, and he has time to celebrate the yearly festivals of his gods and the marriages of his kinsfolk. The mango is then covered with blossom, and the landscape is gay with the beautiful and sweet-scented flowers of the *kakke* or Indian laburnum. The southerly breezes that blow during the night are the voluptuous zephyrs of this vernal season. The *grīshma ʔitu*, literally sweating season, is the second. It is the hottest part of the year, the sun being nearly vertical. The dust of the arid fields is frequently carried up in small whirlwinds, forming what are called *pisāchis* or devils. Nightly illuminations of the ghats and hills are seen, the result either of spontaneous combustion from the friction of bamboos against each other, or of a spark blown into the long withered grass which covers the slopes. The heat is intense and the air often still and stagnant. The sunset glows with the most fervid tints. It is the time of cyclones. Thunderclouds suddenly gather, and—preceded by storms of dust, which sweep impetuously over the surface of the ground, obscuring the view for miles,—the rain, accompanied with vivid flashes of lightning, close followed by startling claps of thunder, descends in large and distant drops, often mixed with hail. These short-lived tempests prelude the grateful bursting of the monsoon, and introduce the *varsha ʔitu* or rainy season. The south-west monsoon blows steadily during this period and should bring with it abundance of rain. The rivers are swollen and sometimes impassable for days. The face of nature is clad in green and the ploughed fields receive the precious seed. The *s'arad ʔitu* or autumn next succeeds, during which the sun being again vertical in his southern declination but shedding a moderate heat, the fruits of the earth ripen. This season closes with the change of the monsoon, which is marked by the loudest thunder and heaviest rain of the year, the wind settling steadily in the north-east. The largest tanks are often filled in a few hours and a store of water obtained that will last over the succeeding dry months. The *hemanta ʔitu* or winter next sets in, with chilly foggy mornings and bright sunny days. The fields are reaped and the grain stacked. The *s'is'ira ʔitu* or cold season concludes the circle of the year. Piercing north-east winds dry up all trace of moisture, and clouds

of dust arise from every movement over the thirsty ground. The skin is parched and feverish. But the larger trees put forth new leaves or cover themselves with a mass of gorgeous blossom.

The year in Mysore may, however, with sufficient accuracy be divided, according to another Hindu system as old as the Vedas, into three seasons—the rainy, the cold, and the hot. The first commences with the bursting of the south-west monsoon, at the end of May or early in June, and continues with some interval in August or September to the middle of November, closing with the heavy rains of the north-east monsoon. It is followed by the cold season, which is generally entirely free from rain, and lasts till the end of February. The hot season then sets in, towards the beginning of March, and increases in intensity to the end of May, with occasional relief from thunder-storms.

The close of the rainy season in November is marked by dense fogs which prevail all over the country during December and January. They begin about three in the morning and last till seven, when they are dispersed by the heat of the sun. But in some parts fogs or rather mists follow the earlier rains. Thus about Chitaldroog from August to October the hills are obscured till nearly ten in the forenoon.

The temperature is the most equable during the rainy months, the range of the thermometer at Bangalore at that season being between 64° and 84° . In the cold season the mercury falls there as low as 51° in the early morning, and sometimes rises to 80° during the day. The minimum and maximum in the shade during the hottest months are about 66° and 91° , or in extreme seasons 96° . The observations registered in the several Districts are given in Vol. II.

Situated midway between the eastern and western coasts, Mysore shares in both monsoons, the south-west and the north-east. The rainfall ranges from 200 inches or more¹ a year in the Western Ghat regions, to little more than 10 inches in the north centre. But these are extremes that apply only to limited areas. The excessive rain of the Malnád rapidly diminishes eastwards, and from 30 to 36 inches may be accepted as the general average for the greater part of the country. The least quantity of rain falls throughout the tracts lying north-east from the Baba Budan range along both banks of the Vedavati or Hagari to the Chitaldroog frontier of the Province. Compared with the rest of the country this may be termed a rainless district, and the scanty fall is attributed, no doubt correctly, to the influence of the towering mass of the Baba Budan chain intercepting the moisture with which the south-west monsoon wind is charged.

¹ Mr. R. H. Elliot mentions that no less than 291·53 inches fell between April and the end of September (1893) at a cardamom plantation on the crests of the ghats.

The annual rainfall may be conveniently distributed into four periods, namely :—

- The cold weather rains December to March.
- The hot weather rains April and May.
- The south-west monsoon June to September.
- The north-east monsoon October and November.

The *cold weather* rains are insignificant, scanty in quantity, and not much needed for the standing crops. But they are useful in keeping up the pasture supply of the country. The *hot weather* rains (sometimes called mango showers) are of the accidental kind ; heavy short storms from the east. They are very important to successful agriculture, as a copious fall replenishes the tanks and enables the cultivators to prepare the land for the following *south-west monsoon* rains. These are perhaps the most essential for the country, which, on account of its general dryness, requires the steady drizzling and persevering rains of this season to make the soil productive. The *north-east monsoon* rains are especially important for filling the tanks and providing a store of water that may last over the rainless months.

The following averages for each District have been calculated for each season, based on the registered fall in the various taluqs in inches and cents for twenty-four years, from 1870 to 1893 :—

District.	Cold Weather. Dec.—Mar.	Hot Weather. Apr.—May.	S.W. Monsoon. June—Sept.	N.E. Monsoon. Oct.—Nov.	Annual Average.
Bangalore	1'32	4'80	15'64	7'88	29'64
Kolar	1'08	3'69	13'53	7'06	25'36
Tumkur	0'85	4'38	13'66	6'69	25'58
Mysore	1'63	6'98	10'21	8'36	27'18
Hassan	1'32	6'42	19'37	8'15	35'26
Shimoga	1'03	5'58	48'96	7'50	63'07
Kadur	1'29	6'29	43'96	9'39	60'93
Chitaldroog	1'10	3'72	10'40	6'69	21'91
Average for the Province	1'20	5'23	21'96	7'72	36'11

There seems to be a periodicity in the rain-fall, particularly well marked at Tumkur, which is situated at an equal distance from either coast and between the eastern and western mountain systems. A reference to the observations there recorded will show that for a considerable period every sixth year was one of abundant rain. This rule is not exhibited with equal precision in the register of other Districts. But there seems to be a general impression that about one year in five is a

good season for rain. And this accords to some extent with scientific discoveries ; for a connection or correspondence has been traced between the terrestrial rainfall and the solar spots which gives a period of five and six, or of eleven, years during which the mutual variation is more or less constant.¹

A special department has now (1893) been formed for meteorology in Mysore, with a well-equipped Observatory at Bangalore, where reports will in future be received from 151 rain-gauge stations. But meanwhile the following information from Mr. H. F. Blanford's book² is of interest. Writing of the summer monsoon, he remarks that "in Mysore, the Ceded Districts of Madras, the Deccan and Hyderabad, more rain falls when the strength of the monsoon to northern India relaxes, than when the interior plateau of the peninsula is swept by a strong current from the west coast." The mean annual relative humidity of the Mysore Province is set down as 66, that of Malabar and Coorg being 79, and of the Carnatic 67. The mean monthly rainfall at the following stations, based on the records of 50 years, is thus given, in inches and cents. :—

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Bangalore...	0'2	0'1	0'6	1'3	5'0	3'2	4'0	5'9	6'3	6'4	1'9	0'7
Mysore.....	0'1	0'1	0'7	2'2	5'6	1'9	2'3	3'2	3'9	6'4	1'6	0'5
Shimoga ...	0'1	0'1	0'3	1'8	3'3	4'7	6'6	4'2	3'1	5'0	1'2	0'4

The maximum is 25'9 at Shimoga in July, 19'5 at Bangalore in October, and 15'3 at Mysore in July.

Another important item is the estimated mean rainfall, as follows, on the several river basins. The figures, it must be remembered, include the portions that are beyond the limits of Mysore. Pennaur (N. Pennár), 26 inches ; Pálár, 36 ; Panar (S. Pennár), 38 ; Kávéri, 44 ; Krishna above junction, 59 ; Tungabhadra, 43.

"Earthquakes"—Dr. Heyne observes—"are never violent and by no means frequent in this country, occurring only about once in five years." My own experience does not enable me to confirm this latter statement, but shocks have been occasionally felt in the neighbourhood of the hills running from Kankanhalli to Madgiri. From an inscription at Nelaman-gala, it appears that an earthquake occurred there in July, 1507. "I felt one at Túmkúr," writes Dr. Heyne, "on the 23rd of October, 1800. It is remarkable that at the same time a violent hurricane raged along the coast from Ongole to Masulipatam. The shock was felt at Bangalore

¹ Generally speaking, there appears a tendency with maxima (of sun-spots) to anticipate the middle time between the consecutive minima, the interval 11'11" being divided into two unequal sub-intervals of 4'77" and 6'34".—Chambers, *Astron.*, 17.

² "Climates and Weather of India," pp. 211, 50, 353, 284.

and in most other parts of Mysore ; and it was stronger in the south than where I was. It seemed to come from the north, proceeding southward along the inland range of hills, and to be guided farther by those of which Sivaganga and Savandurga are the most conspicuous." Colonel Welsh says, with reference to Bangalore :—" On the 29th of December (1813), we experienced a pretty smart shock of an earthquake, which was very general in its effects all over the cantonment ; it was accompanied by a rumbling noise, like a gun-carriage going over a drawbridge, and appeared to come from the westward. Our roof cracked as if a heavy stone had been thrown upon it, and every part of the house shook for some seconds. Some older and weaker buildings were actually shaken down, and the walls of others separated or opened out." An earthquake was felt at Tumkur in 1865, and several shocks at Bangalore on the 31st of December, 1881.

Aerolites or meteoric stones sometimes fall. On the 21st of September, 1865, one weighing $11\frac{1}{2}$ lbs. fell near Maddur in the Mysore District. It is deposited in the Museum.

Cyclones in the Bay of Bengal occasionally extend their influence far inland. One of the 2nd of May, 1872, was very destructive in its effects ; it blew a hurricane that overturned large trees even so far west as Coorg, and was accompanied by a deluge of rain. Again on the 4th of May, 1874, when a cyclone was raging on the Madras coast, a steady rain poured at Bangalore, which continued without intermission for about forty-eight hours. It had been preceded for several days by a still and hazy appearance of the atmosphere. At the end of November, 1880, just at the beginning of the ragi harvest, when but little was cut and the bulk of this most important crop was all but ripe, a great part of the State was visited by a storm of wind and rain of unusual severity, which did very considerable damage to the crops, and was the cause, moreover, of the breaching of a number of irrigation tanks. On the 16th of November, 1885, again, there was a continuous downpour lasting for more than forty-eight hours, but this was not of a violent character.

"Next to its sunny skies and its notorious and somewhat oppressive heat, perhaps no feature of the Indian climate," says Mr. Blanford,¹ "is more characteristic than the prevailing lightness of the wind." And to this cause, rather than to want of mechanical skill on the part of the cultivators, he attributes the absence of windmills in India. The average daily movement of the wind at Bangalore is put down at from 82 (Feb.) to 92 miles from October to March, 128 to 183 in May and August to September, 203 in June and 208 in July.

¹ *Loc. cit.* p. 30.

FLORA

The situation of Mysore within the tropics, combined with an elevation which gives it a temperate climate, and its almost complete environment by lofty mountain chains, are features which contribute to the formation of a rich and varied flora.

The *forests*¹ of the country, which yield a considerable item towards its revenue, have been estimated to cover a total area of 2,975 square miles, exclusive of scrub jungle which grows on much of the waste land. They may be roughly divided into *evergreen* and *deciduous* forests; which again are distributed in three distinct forest belts, of very unequal width, and running north and south. These are the *evergreen belt*, the *dry belt*, and an intermediate one, combining some of the features of both, which may be called the *mixed belt*.

The *evergreen belt* of forests is confined to the west, and comprises the country in the Western Ghats and below them, extending from the north of Sagar taluq to the south of Manjarabad. Its greatest width, which is at its northern extremity, nowhere exceeds from 12 to 14 miles, and at some points is not more than six. The tree vegetation is magnificent. Many of the hills are covered to their summits with heavy forest, while the valleys and ravines produce trees which can scarcely be rivalled in India,—so luxuriant is their growth, so vast their height, so great their size. In some parts the undergrowth is dense, elsewhere the forest is open, and on all sides trees with clear stems to the first branch of from 80 to 100 feet meet the eye.

The following are some of the more valuable trees growing in this belt² :—

Artocarpus hirsuta ... Wild jack Heb-halasu, hesava³

Good shade for coffee. Yields the anjeli wood of commerce. Wood hard and durable when well seasoned, yellowish-brown, close-grained. Much used on the western coast for house and ship-building, furniture, and other purposes. Weight about 35 lbs. per cubic foot.

¹ Originally based chiefly upon the Forest Report for 1869–70, by Captain van Someren, Conservator of Forests.

² The third edition of "Forest Trees of Mysore and Coorg," by the same, edited by Mr. J. Cameron, may be referred to for fuller information; or Watts' "Dictionary of the Economic Products of India."

³ In common use the Kannada name is put into the genitive case, followed by the word *mara*, tree. Hence *heb-halasinu mara*, *hesavana mara*: *dilpada mara* would be more intelligible to a native than the bare name.

Calophyllum tomentosum Poon spar Kuve, bobbi

Yields poon spars, which fetch a good price, and are used for masts. Wood reddish and coarse-grained. Weight 48 lbs. per cubic foot.

Diospyros ebenum... .. Ebony Kare, mallali

Heartwood black, very hard, durable, and takes a fine polish. Weight about 80 lbs. per cubic foot. In great demand for cabinet work, turnery, inlaying, and musical instruments.

Erythroxyton monogynum Red cedar Devadaru, adavi goranti

Heartwood dark brown and fragrant ; sometimes used as a substitute for sandal. From it is distilled a tar or oil used in Ceylon to preserve timber. Leaves and bark medicinal.

Garcinia morella Gamboge-tree Kankutake

The yellow pigment which exudes from an incision in the trunk is the true gamboge of commerce. Wood hard and mottled. Weight about 56 lbs. per cubic foot.

Lagerstroemia flos-reginæ... .. Challa, maruva

Very handsome in blossom. Root, bark, leaves, and flowers used medicinally. Wood light red, strong, and very durable under water. Weight about 42 lbs. per cubic foot.

Soymida febrifuga ... Redwood Swámi mara

Bark used for tanning and as an inferior dye ; is also a febrifuge. Heartwood very hard and close-grained, reddish-black, very durable, not attacked by white ants. Weight about 76 lbs. per cubic foot.

Vateria indica White dammar Dúpa

Magnificent tree. Yields the gum-resin known as white dammar or Piney resin, locally used as an incense and varnish. A fatty oil from the seeds is employed like tallow for making candles. Heartwood grey, tough, moderately hard, porous. Weight 41 lbs. per cubic foot. Not much in demand.

The *mixed belt* of forest extends the whole length of the Province, from the extreme north of Sorab taluq to Bandipur in the south of Gundlupet taluq. It is very unequal in width, varying at different points from 10 to 40 or 45 miles. It includes the greater number of the timber-producing State forests, large tracts of District forests, and much sandalwood. In it are the káns of Sorab and other portions of Nagar, the areca nut and cardamom gardens of western Mysore, the coffee plantations of Koppa and Manjarabad, and the rich rice-flats of Ságar, Nagar, Tirthahalli, Chikmagalur and Heggadadevankote. The division between this rich and productive belt and the far less useful strip to the west of it cannot be very easily defined. The presence of a number of fine *nandi* and blackwood trees, which grow abundantly and attain great size on the eastern confines of the evergreen belt, form a sufficiently clear line. The eastern limit may be taken to be a line which, commencing near Anavatti in the north, would run south-east to half-way between Shikarpur and Honnali ; thence due south to Sakrebail, where

it turns due east till it reaches a point north of Lakvalli ; thence south, through Lakvalli and along the eastern crests of the Baba Budans to Vastara ; on through Pálya, and passing a few miles west of Arkalgúd and Peryapatna it turns south-east to Antarsante, and so by way of Kurnagal reaches Bandipur.

The tree vegetation varies considerably in the large extent of country comprised in this belt. All along the western confines, where it approaches the Ghats, trees proper to the evergreen forests occur frequently. The wild jack, the *dúpa*, the redwood and sometimes the poon are met with in varying quantities. But in the south portion of the belt, in the Mysore District, wild jack and poon are unknown. The following is a list of the more important trees found throughout this tract :—

Adina cordifolia Arasina tega

Wood yellow, moderately hard, even-grained. Seasons well, takes a good polish, and is durable, but liable to warp and crack. Weight 45 lbs. per cubic foot. Turns well, and specially used for small articles, such as combs, gunstocks, and ornamental boxes.

Albizzia lebbek Siris Bági

Heartwood dark brown ; takes a good polish, and fairly durable. Weight 50 lbs. per cubic foot. Its use for domestic purposes considered unlucky in many parts, but used for picture frames, oil-mills, etc. Leaves a good fodder for cattle. Flowers a cooling application for boils.

Albizzia odoratissima * Bilvara

Heartwood rich brown, tough and strong ; seasons well, takes a good polish, and is durable when kept dry. Weight 50 lbs. per cubic foot. Used for wheels, oil-mills, and agricultural implements. Bark medicinal. One of the most valuable jungle trees for the use of the villagers.

Anogeissus latifolia Dindiga

Good fuel and charcoal tree. Sapwood yellow ; heartwood small, purplish-brown, tough, very hard. Weight about 65 lbs. per cubic foot. Splits in seasoning and must be kept dry to last. Gum used by calico printers for dyeing purposes ; green leaves employed for tanning.

Bombax malabaricum Silk-cotton Búrga

Wood soft, white, spongy, and, except under water, very perishable. Used to some extent for planking, packing cases, toys, floats, etc. A medicinal gum exudes from the trunk.

Chloroxylon swietenia Indian satin-wood Huragalu

Wood hard, yellow-mottled, and prettily veined, dark towards the centre ; has a fine satiny lustre, and is well adapted for delicate cabinet work, carpentry, and turnery. Weight 56 lbs. per cubic foot. Heartwood said to be black, heavy, and not easily burnt. The wood is also very durable under water. Used for beams, posts, boats, etc., and in Europe for backs of brushes, stethoscopes, and fancy articles.

Cordia myxa Solle

There are three local varieties—kádu solle, kempu solle, and solle kendal—differing

in size, form, and colour of the fruit. The last is the Sebasten of commerce (a name said to be derived from *sag-pistán*, Persian for dogs' nipples). It is very mucilaginous and demulcent; given for coughs and chest affections. Wood grey, soft, porous, seasons well, and is fairly strong; but soon attacked by insects. Used for agricultural implements, sugar-cane mills, boats, and fuel. Rope made from the bark, which is also medicinal.

Dalbergia latifolia ... Blackwood ... Biti

Valuable furniture wood, resembling rosewood. Heartwood dark purple and extremely hard, but somewhat brittle. Weight 55 lbs. per cubic foot. Used in Mysore city for articles inlaid with ivory, also elsewhere for cart-wheels, gun-carriages, etc. Shade tree for coffee.

Dalbergia paniculata ... Pachari

Wood greyish-white, soft, and perishable; very subject to attacks of insects. Weight about 42 lbs. per cubic foot when seasoned.

Dalbergia sissoo ... Biridi

Wood very durable, seasons well, and highly esteemed for all purposes where strength and elasticity are required. Suitable for boats, carriages, etc.

Dillenia pentagyna ... Kóltega

Wood nicely marked, but heavy, coarse-grained, and difficult to season. Weight 50 lbs. per cubic foot.

Gmelina arborea ... Kúli

Wood cream to pale yellow, close-grained, strong, and does not warp or crack in seasoning. Weight about 30 lbs. per cubic foot. Much esteemed for furniture, carriages, and ornamental work of all kinds.

Grewia tiliaefolia ... Tadasalu

Wood light reddish-brown, compact, close-grained, durable, elastic, and easily worked. Valuable where strength and elasticity are required. Used in cart and carriage building, also for masts, oars, and shafts. Weight 35 lbs. per cubic foot. Fruit eaten.

Holoptelea integrifolia ... Entire-leaved elm ... Tapasi

Wood yellow or light brown, no heartwood, soft, open-grained, but strong. Weight 37 lbs. per cubic foot. Used for charcoal; also for country carts, and sometimes for carving.

Lagerstrœmia lanceolata ... Nandi

Wood red, smooth, even-grained, elastic, tough, and of great transverse strength. Weight about 45 lbs. per cubic foot. Seasons well, and durable if preserved from moisture. But felled trees soon decay if left exposed in the forest. Used in Coorg for buildings; also used for furniture, carts, and mills.

Mallotus philippinensis ... Kunkuma

The powder from the ripe fruit forms the Kamala dye, also known in the south of India as Kapila. Wood only fit for fuel. Weight 48 lbs. per cubic foot.

Michelia champaca ... Champac... Sampige

A favourite tree of Hindu poetry, well known for the fragrance of its blossoms, which are worn in the hair, etc. Wood soft, seasons and polishes well. Very durable. Weight about 40 lbs. per cubic foot. Used for furniture, carriages, etc.

Phyllanthus emblica ... Emblic myrobalan ... Nelli

Wood mottled-reddish, hard and close-grained, warps and splits in seasoning.

Weight about 50 lbs. per cubic foot. Remarkable for its durability under water, which it also clears of impurities. For this purpose chips of it are thrown into wells or ponds. The bark is used for tanning. The fruit, resembling a gooseberry, is acid and astringent. Much used as an article of food, raw, preserved, or pickled.

Pterocarpus marsupium ... Indian kino Honne

Wood close-grained, reddish-brown, tough, strong, durable, seasons well, and takes a good polish. Weight 53 lbs. per cubic foot. Makes good furniture, and widely used for carts, window frames, agricultural implements, etc. Bark yields crimson gum, the true kino of commerce.

Schleichera trijuga ... Ceylon oak Ságade, chendala

Wood very hard, strong, durable, and takes a fine polish. Weight about 70 lbs. per cubic foot. Used for pestles, axles, teeth of harrows, screw rollers of mills. In the Central Provinces lac is produced on this tree, known as *kusuma* lac, the most highly prized of all. Bark and oil from the seeds medicinal; the latter said to be the original Macassar oil.

Stephegyne parvifolia Kadaga

Similar to *Adina cordifolia*, but not used much in the south of India.

Sterculia villosa Shi-anvige

Wood said to be firmly close-grained, suitable for building and furniture. Bags and ropes made of the fibrous bark.

Tectona grandis Teak¹ Tegu, tyága

The chief value of this well-known wood arises from its strength, added to its durability, due probably to the resinous matter in the pores, which resists the action of water. Weight varies in different localities, but approximately 45 lbs. per cubic foot when seasoned. Used in India for numerous purposes—construction, ship-building, sleepers, and furniture; in Europe for railway carriages, ships, and the backing of armour plates in ironclads.

Terminalia chebula ... Black myrobalan Alale, arale

The fruit is most valuable as a tan. The gall-nuts make excellent ink and dyes. Wood hard and fairly durable. Weight about 60 lbs. per cubic foot. Used for furniture, carts, and agricultural implements.

Terminalia paniculata Huluve, hunal

Timber of middling quality, especially when seasoned in water. Heartwood dark, hard, and fairly durable. Weight 47 lbs. per cubic foot. Used for the same purposes as *Matti*. Also for fuel, planking, and country carts. In the ground is liable to attacks of white ants.

Terminalia tomentosa *Matti*

Wood dark brown, with darker streaks, hard, but not very durable. Weight about 60 lbs. per cubic foot. Good fuel tree; leaves useful as manure for areca-nut gardens. Yields a gum said to be used as an incense and cosmetic. Bark used for tanning.

Vitex altissima Naviládi

Valuable wood; brownish-grey when seasoned. Weight 63 lbs. per cubic foot. Used, when procurable, for building and agricultural work.

¹ The finest teak in Mysore is found in the State forests of Lakvalli, Bisalvadi, Kákankóte, Begur, and Ainur Márigudi. The teak plantations in Mysore cover an area of about 4,000 acres.

Xylia dolabriformis ... Iron wood Jambe

Wood dark red or brown, very strong, hard, tough, and durable; not attacked by white ants. Weight 65 lbs. per cubic foot. Used for building and agricultural implements, also for the best charcoal.

The bamboo, scientifically reckoned a giant grass, abounds in the large forests, and is one of the most valuable products. The common species is *Bambusa arundinacea*, the spiny bamboo (*bidaru*). *Dendrocalamus strictus* is the "male bamboo" (*gandu bidaru*), a solid bamboo used for spear or lance staves, walking-sticks, &c. The largest bamboos, known as *ande bidaru*, are said to be found in the forests of the Mysore District. The periodical dying off of the bamboo after seeding is a well-known phenomenon. The seed, called bamboo rice, generally appears at a time of drought, when the crops have failed, and is eaten by the poorer classes. The uses of the bamboo are innumerable, and there is scarcely a domestic purpose to which it is not applied.

The following trees are also common in these forests:—

Acacia arabica Bābul Kari Jāli, gobi

Yields the Indian gum arabic. Wood pale red, turning darker on exposure, close-grained, tough, and very durable when seasoned in water. Weight about 54 lbs. per cubic foot. Much used for naves, spokes and felloes of wheels; also for rice-pounders, oil and sugar mills, agricultural implements, etc. Tan, dye, fibre, food, and medicine are obtained from the bark or pods.

Acacia leucophloea... Bili Jāli, topal

Good fuel tree. Sapwood large; heartwood reddish-brown, tough, and easily seasoned. Weight about 55 lbs. per cubic foot. Bark used in distilling arrack. The young pods given to sheep supposed to improve the quality of the mutton. Gum, dye, fibre, and medicine are also obtained from this tree.

Egle marmelos Bael Bilpatre

Greatly esteemed for the medicinal properties of root, bark, leaves, and fruit. The pulp of the latter a specific for dysentery and diarrhoea. Its shell or rind is made into snuff-boxes. Wood strongly scented when fresh cut, yellowish-white, hard, and durable. Weight about 50 lbs. per cubic foot. Seldom felled, as it is considered sacred, and the leaves indispensable for the worship of Siva.

Butea frondosa Muttaga

Whole tracts of country are gay with its gorgeous orange-crimson flowers at the beginning of the hot weather. The leaves are used as plates, and the branches for sacrificial purposes. A red gum called bastard kino obtained from the bark. From the flowers is prepared the red juice squirted about in the Holi festival. The seeds anthelmintic and a common remedy for horses. Wood of little value, but said to be durable under water. Weight 35 lbs. per cubic foot.

Eugenia jambolana ... Black plum, Jamoon ... Nerale

There are two varieties, *caryophyllifolia* (náyi perale) and *obtusifolia* (jambu nerale). The latter, bearing larger fruit, is most abundant in the Malnád. Fruit, which has a very astringent taste, leaves, seeds, and bark medicinal, and the latter used for dyeing and tanning. Wood whitish, hard, tough, and durable in water. Weight 45 lbs. per cubic foot. Used for buildings and agricultural implements.

Feronia elephantum ... Wood-apple Bela, byála

The acid pulp of the fruit generally eaten, either raw or sometimes in the form of a jelly like black currant. Wood yellowish, close-grained, hard, and durable. Weight 50 lbs. per cubic foot. Used like the foregoing. The bark yields a white transparent gum resembling gum arabic.

Ficus bengalensis Banyan Ala

Good shade for coffee. Wood of little value, but durable under water, and therefore used for well frames. Weight about 37 lbs. per cubic foot. The wood of the aerial roots used for tent-poles, cart-yokes, etc. From the milk sap birdlime is made; it is also applied to sores and bruises. The young leaves are used for plates.

Ficus glomerata Country fig Atti

Uses similar to those of the above. Cattle eat the fruit greedily; it is also eaten by the poor in times of scarcity. The tree imparts moisture to the soil around its roots.

Ficus religiosa Peepul Arali, rági, asvattha

Wood of no value. Other uses similar to those of the above. A sacred tree, planted at the entrance of every village along with the margosa, to which it is married with the due ceremonies. Perambulations of the tree supposed to confer male issue and other blessings.

Mangifera indica Mango Mávu

Well known for its delicious fruit throughout India. Wood used for minor works of carpentry, but does not stand exposure, and is liable to attacks of insects. Weight about 40 lbs. per cubic foot. Besides being eaten raw, the fruit is made into chatnis, pickles, and preserves. Medicinal properties are attributed to almost every part of the tree. The leaves, strung on a thread, are hung up as a sign of welcome at the lintel of doorways.

Phoenix farinifera Dwarf date Sanna ichalu

The leaves are used for thatch, and as fuel for potteries. The farinaceous pith of the stem seems not to be eaten here as in some other parts of India.

Phoenix sylvestris Wild date, Toddy palm¹ Ichalu.

From the juice is produced the toddy or arrack of the country; and a small proportion is boiled down for making jaggery and date-sugar. Good mats are made from the leaves.

Tamarindus indica... ... Tamarind Hunise

Most valued for its fruit, which is largely used in food and for making a cooling drink. The seeds are also roasted and eaten; and a size made from them is used by Kurubars as a dressing for kambliis or country-made blankets. Fruit, leaves, and seed are also medicinal. Heartwood very hard and durable, but difficult to work. Weight about 60 lbs. per cubic foot. Used for naves of wheels, rice-pounders, mallets, tent-pegs, oil and sugar mills, handles to tools, and so on.

The third or *dry belt* lies to the east of the mixed forest belt, and includes the far greater portion of the Province. The tree vegetation is much inferior to that immediately to the west, the change being in some parts gradual, in others very marked. The latter is especially per-

¹ The groves of this toddy palm, which is a Government monopoly, cover altogether an area of something like 30,000 acres in the Maidán parts of the State. The finest are in the Chitaldroog and Mysore Districts.

ceptible near the Baba Budan hills, which from their elevation arrest much of the rain which would otherwise pass to the east and north-east. The difference between the abundant vegetation of the Jágar valley to the west, and the scanty vegetation to the east, of the Kalhatti hills in the Baba Budans is remarkable.

Many of the trees found in the mixed belt are common to this third tract, but as a rule they are of smaller growth. This is specially noticeable in teak, which is only met with stunted, twisted and small; in some of the *combretaceæ*, and very marked in some of the *leguminosæ*.

Besides the different kinds of *figus*, the mango, tamarind and jamun, the ippe (*bassia latifolia*) and jack (*artocarpus integrifolia*) grow well. The acacias of the preceding list, the wood-apple, bael-tree and pachari also thrive. The wild date (*phœnix sylvestris*) grows in the western part and the dwarf date (*phœnix farinifera*) in the centre and west. The custard-apple (*anona squamosa*) grows wild rather abundantly in the waste lands of the Sira taluq. Among others the more valuable and common trees are:—

Acacia catechu Kagli

Catechu (*káchu*) is obtained by boiling down a decoction from chips of the heart-wood. It is not much made in Mysore, and is principally used for mastication and medicine. There are two kinds, dark and pale, of which the latter only is used for chewing. Heartwood dark red, hard, durable, seasons well, and takes a fine polish; not attacked by white ants. Weight about 70 lbs. per cubic foot. Much used for fuel and charcoal. Also for oil and sugar mills, bows, handles to arms, and for agricultural implements.

Alangium lamarckii Ankóle

Good for fuel and fences. Wood light yellow outside, dark brown in the centre, hard, even-grained, tough, and durable. A beautiful wood when well seasoned. Weight about 52 lbs. per cubic foot. Used for pestles, wooden bells, and other minor purposes. Fruit acid; nearly every part of the tree medicinal.

Anogeissus latifolia Dindiga

See above (p. 70).

Averrhoa carambola Kamaraka

Fruit eaten raw, also stewed, curried, and pickled. Wood light red, hard, and close-grained. Weight about 40 lbs. per cubic foot.

Buchanania latifolia Murkali

Well known for its edible seeds, in some places used as a substitute for almonds. Heartwood seasons well and sufficiently durable for protected work. Weight 36 lbs. per cubic foot. Bark can be used in tanning.

Dalbergia lanceolaria Hasar ganni

Wood whitish, heavy, weighing 62 lbs. per cubic foot, but not durable. Root, bark, and an oil from the seed, medicinal.

Diospyros tupru Tupra

Fruit eaten by cowherds. Leaves used for folding native cigarettes. The Mahrattis obtain from the root a coloured paste for caste marks.

Dolichandrone falcata Udi

A coarse dark fibre obtained from the inner bark. Heartwood hard enough for implements and village buildings.

Gardenia gummifera Bikke

The medicinal gum-resin, known in trade as *dikamali*, exudes from the extremities of the young shoots and buds; said to have an offensive smell. Wood white, very hard, might serve for box-wood.

Hardwickia binata Karáchi

One of the most durable timbers in India.¹ Heartwood abundant, close-grained, dark red tinged with purple, soft and easy to work when fresh cut, but afterwards becomes extremely hard. Weight unseasoned 80 lbs. per cubic foot; seasoned wood much lighter. Used for bridges, houses, and agricultural implements. Gum, tan, and fibre are also obtained from it. The young shoots and leaves very extensively used for fodder.

Ixora parviflora Torch-tree Gorivi, hennu gorivi

The branches are used as torches by travellers and postal runners. The flowers, pounded in milk, used as a remedy for whooping-cough. Wood, though small, said to be hard and even-grained. Weight about 60 lbs. per cubic foot. Well suited for turning.

Lagerstroemia parviflora Chaunangi

Wood light grey, tinged with red, and darker towards the centre; straight-fibred, tough, elastic. Weight about 50 lbs. per cubic foot. Used for agricultural implements, and considered fairly durable. Fibre, tan, dye, and an edible gum obtained from the bark. The tasser silkworm feeds on the tree.

Morinda umbellata Maddi

From the root is obtained the yellow dye known as *Maddi banna*. Fruit said to be curried and eaten.

Pongamia glabra Indian beech Honge

Wood tough and light, weighing about 40 lbs. per cubic foot, white when cut but turning yellow on exposure, coarse-grained, fibrous, and not durable, but said to improve when seasoned in water. Large trunks used for the solid wheels of waddar carts. Oil from the seed is used for lamps and medicinally; also other parts of the tree for the cure of rheumatism and skin diseases. Leafy branches used as green manure for paddy fields. The flowers also used for manure to crops. Honge cake forms a manure to coffee.

Semecarpus anacardium Marking nut Géru

Wood of little value, as it cracks in seasoning. Weight 42 lbs. per cubic foot. The juice from the growing tree said to cause blisters when handled; is therefore ringed some time before felling. The fleshy cup on which the fruit rests is eaten. The juice of the fruit proper is used as medicine, also for varnish, and mixed with lime for marking linen. Oil from the seed is said to be made use of in taming wild elephants, and birdlime prepared from the fruit when green.

Shorea talura Lac-tree² Jalári

The lac insect is propagated on it, and besides lac, a kind of dammar is obtained from the tree. Wood yellowish, heavy, and durable, capable of taking a good polish, and used for building. Weight 54 lbs. per cubic foot.

¹ Mostly confined to the Tumkur and Chitaldroog Districts, and specially abundant in Bukkapatna, near Sira, and in Molkalmuru taluq.

² Most abundant in the Anekal and Closepet taluqs, and in the Nandidroog hills.

Stereospermum chelonoides Pádri

Wood said to be tremendously hard and almost indestructible under water. Sawyers object to saw it. Used for beams and posts.

Zizyphus jujuba Indian jujube, bér ... Yelachi

The fruit is better known in northern India. Wood hard, even-grained, tough and durable. Weight 58 lbs. per cubic foot. Bark very astringent and exudes a medicinal gum.

Zizyphus xylopyrus Challe

The fruit used as a dye for blackening leather. Wood hard and tough. Weight about 60 lbs. per cubic foot. Used for walking-sticks and torches.

Among shrubs and useful bushes are :—

Calotropis gigantea ... Madár, giant swallow-
wort Yekka

The plant is filled with a milky sap which hardens on exposure to light, forming a kind of gutta percha, except that it is a conductor of electricity. Medicinal virtues are attributed to every part of the plant. The inner bark yields a bast fibre, which has been suggested as a material for making paper. The silk-cotton of the seed forms the Madár floss of commerce.

Cassia auriculata Tanner's bark Tangadi

The bark is one of the best Indian tañs,¹ and the root bark is used for tempering iron with steel. Bark and seeds are also medicinal. Twigs used for native tooth-brushes.

Cassia fistula Indian laburnum ... Kakke

Wood small but durable, weighing 50 lbs. per cubic foot. Hard but brittle and apt to fracture. Used for paddy-grinders, posts, and agricultural implements. From the bark are obtained fibre, tannin, and gum. The fresh pulp of the fruit forms a purgative, and the dried leaves are laxative.

Jatropha curcas Physic nut Mara haralu

The young twigs are used as tooth-brushes, the milky juice being considered to strengthen the teeth and gums. The milk sap is a good styptic, and dried in the sun forms a reddish-brown substance like shell-lac. The external application of a decoction of the leaves will excite the secretion of milk. Commonly planted for fences, as cattle will not eat it.

The sandal-tree (*santalum album*), gandha, srigandha—a product principally of Mysore and a State monopoly, yielding the largest share of the forest revenue—is found all over the country, but grows very unequally in different parts. It is never met with in the evergreen belt or in heavy forests of the mixed belt, but is most abundant along the eastern skirts of the last-named tract; in the taluqs bordering on the Káveri; and in those lying along the chain of hills which runs from Kankanhalli up to Madgiri. In the Chitaldroog and Kolar Districts it is very scarce.

¹ An analysis by Professor Hummel, of the Yorkshire College, Leeds, showed the bark to contain 20·5 per cent. of tannic acid.

The tree attains its greatest bulk and height in taluqs with a moderately heavy rain-fall, but the perfume of wood grown in such localities is not so strong as of that grown in more arid spots, especially where the soil is red and stony. It will thrive among rocks where the soil is good, and trees in such places though small are generally fuller of oil. The bark and sapwood have no smell, but the heartwood and roots are highly scented and rich in oil. The girth of a mature tree varies, according to circumstances, from 18 to 36 or, in exceptional cases, 40 inches. It attains maturity, in about twenty-five years. The older the tree, the nearer the heartwood comes to the surface; while the bark becomes deeply wrinkled, is red underneath, and frequently bursts, disclosing in old specimens the absence of all sapwood. In colour and marking, four varieties of the wood are distinguished:— *bili*, white; *kempu*, red; *nága*, cobra; and *navilu*, peacock. The two latter command fancy prices: the names indicate the supposed resemblance of the marks, which are really “caused by the death of adventitious buds.”

The heartwood is hard and heavy, weighing about 61 lbs. per cubic foot. The best parts are used for carving boxes, cabinets, desks, walking-sticks, and other useful and ornamental articles. The roots (which are the richest in oil) and the chips go to the still; while the Hindus who can afford it show their wealth and respect for their departed relatives by adding sticks of sandalwood to the funeral pile. The wood, either in powder or rubbed up into a paste, is used by all Brahmans in the pigments for making their caste marks. The oil forms the basis of many scents, and is sometimes used for disguising with its scent articles which, being really carved from common wood, are passed off as if made from the true sandal. The far greater portion of the wood sold yearly in Mysore is taken to Bombay, where it finds its way principally to China, France, and Germany.

Efforts for the propagation of sandal did not meet with much success some years ago, owing to the delicate nature of the young plant, and its exposure to the ravages of hares and deer. More recently the *lantana* shrub, which grows with the rankness of a weed, has been found to be an effectual nurse for the seedlings.

The following timber trees are also found in Mysore:—

Acacia farnesiana Kastúri jáli, kastúri gobi

The yellow flower heads diffuse a pleasant odour, and are known as Cassia flowers in European perfumery. The plant is said to be obnoxious to snakes and vermin. Wood white, hard, and tough, but too small for general utility. Weight 49 lbs. per cubic foot. A gum like gum arabic is obtained from the stem. Bark and pods medicinal.

Acacia ferruginea Banni

Yields a good gum. Bark very astringent ; used in distilling arrack. Heartwood small in proportion, reddish-brown, very hard. Weight 70 lbs. per cubic foot. Little used on account of its being considered sacred.

Acacia sundra Kempu khaira

Little more than a variety of *A. catechu*. The branches are a darker brown, and the wood heavier and more durable. Weight when seasoned about 80 lbs. per cubic foot. Used for posts in house-building.

Aglaiia roxburghiana Tottila

Fruit buff-coloured, eaten medicinally.

Albizzia amara Sujjala

Good locomotive fuel. Heartwood purplish-brown, very hard and durable, of great transverse strength. Weight about 65 lbs. per cubic foot. Used for carts and agricultural implements. Seasoned limbs used for ploughs.

Albizzia stipulata Hotte bági

Good charcoal tree. Wood used for various purposes, but not very durable. Weight about 40 lbs. per cubic foot. The green leaves a fodder for cattle.

Alstonia scholaris Jantala

Bark and leaves medicinal : the former known out of India as Dita bark, containing the active principle Ditain, said to equal the best sulphate of quinine. Wood soft and light, of little value. Weight 28 lbs. per cubic foot. Used for schoolboys' writing-boards, whence the name scholaris.

Boswellia serrata, var. *glabra* Sámbráni

Wood inferior and only used for fuel or charcoal. The gum-resin is a bastard oilbanum, much used as medicine, and as incense in the temples. The branches make good torches.

Careya arborea Gauju, kavalu

Sapwood abundant, white ; heartwood red, dark in old trees, even-grained, and beautifully mottled. Weight about 50 lbs. per cubic foot. A durable and pretty wood, but not much used in Mysore except for wooden vessels and agricultural implements. Formerly used for the drums of sepoy corps. Bark astringent and yields a very strong fibre, employed as a slow match to ignite gunpowder, and for fuses of native matchlocks. Fruit and flowers medicinal.

Cedrela toona Indian mahogany, ... Gandagarige
white cedar

Wood suitable for furniture and buildings. Said to be durable and not attacked by white ants. Weight about 33 lbs. per cubic foot. Red and yellow dyes obtained from the flowers. Bark medicinal.

Chickrassia tabularis ... Chittagong wood ... Dalmara

Wood beautifully marked, durable, fragrant, easily worked, and takes a good polish. Used especially for furniture and cabinet work. Weight 46 lbs. per cubic foot. Bark astringent. Red and yellow dyes obtained from the flowers.

Cochlospermum gossypium Arisina búrga

The fine floss from the seeds, also called silk-cotton, is used for stuffing pillows in hospitals in Europe, but locally considered to cause much heat. The gum from the trunk is used for tragacanth in northern India. Wood of no value ; weight about 17 lbs. per cubic foot.

Cordia obliqua Chadle

Very similar to *C. myxa* (p. 70) in character. Flowers larger, and plant more hairy.

Cordia rothii Nárvalli

A coarse fibre from the bark used for ropes. Wood said to be grey, compact, and hard.

Cratæva religiosa Nirvala

Wood soft and even-grained. Said to be used for drums, combs, and in turnery. Leaves and bark medicinal.

Diospyros embryopteris ? Kusharta

Fruit rich in tannic acid, but when ripe this disappears and it is eaten. Bark and an oil from the seed medicinal. Wood light brown and not of much value. Uses of the tree not much known in this part of India.

Guazuma tomentosa ... Bastard cedar Rudrákshi

Leaves and fruit much relished by cattle. Bark medicinal. Timber of old trees said to be durable, though light and apt to split. Weight 32 lbs. per cubic foot.

Hardwickia pinnata Yenne mara

An oil or oleo-resin obtained from deep incision into the heart of the tree resembles copaiva balsam in composition and properties, though not so transparent, and of a dark red colour. Sapwood large, heartwood brown. Weight 47 lbs. per cubic foot. Used for building in the parts where it grows.

Macaranga roxburghii, Chenta kanni

A medicinal gum, reddish, and with the odour of turpentine, exudes from the young shoots and fruit. Said to be used for taking impressions of coins, etc., and for sizing paper. Wood soft and useless.

Machilus macrantha Chittu tandri

The properties of this tree are unknown.

Melia azadirachta Neem, margosa Bévu

Every part medicinal. Heartwood used for making idols. The wood is not attacked by insects, is hard, durable, and beautifully mottled. Weight about 50 lbs. per cubic foot. Suitable for cabinet work and carpentry. Neem oil, obtained from the seed, is used for killing insects. Leaves antiseptic, and in the native treatment of small-pox are placed under and around the patient at certain stages of the disease. The tree is considered sacred and planted with the peepul at the entrance of villages, the two being married with due ceremonies, the latter representing the female and the former the male.

Melia azedarach Persian lilac, bead-tree Turuka bévu, huchu bévu

Leaves much relished by sheep and goats. Wood nicely mottled and takes a good polish. Weight about 35 lbs. per cubic foot. Not used. The seeds generally worn as rosaries. The products of the tree resemble those of the neem, but seem to be more used in America than in India.

Melia dubia Giant neem Heb bévu

Wood soft and light, weighing about 25 lbs. per cubic foot. Used by planters for buildings. Not easily attacked by white ants. The dried fruit, resembling a date, is a remedy for colic.

Meliosma arnottiana Massivala

Wood used for poles and agricultural implements: also, apparently, for building purposes.

Moringa pterygosperma ... Horse-radish Nugge

Also, from the form of the flower, known as the drumstick-tree. The fleshy root is a perfect substitute for horse-radish. The Ben oil of commerce, valued as a lubricant by watchmakers, is obtained from the seed, but is seldom made in India, owing to the fruit being saleable as a vegetable, and the seed therefore not being allowed to mature. Nearly every part considered medicinal.

Ochrocarpus longifolius Surgl

The dried flower-buds, known in commerce as *támra nágakésari*, yield a dye for silk. The flowers are used for decoration in temples and on the person. Wood used for local building. Hard, red, close and even-grained. Weight 55 lbs. per cubic foot.

Odina wodier Udi, simti

Wood of little value and liable to attacks of insects. Weight about 55 lbs. per cubic foot. Bark and gum medicinal. Cattle fond of the green leaves.

Pociloneuron indicum Ballagi

Wood very hard and heavy. Not much used except for rice-pounders, agricultural implements, and perhaps walking-sticks.

Polyalthia cerasoides Sanna hesare

Wood olive-grey, moderately hard, close-grained. Weight 52 lbs. per cubic foot. Much used for carpentry in the Bombay country, but not here.

Prosopis spicigera ? Perumbe

Good fuel tree, especially for locomotives. Sapwood large and perishable; heartwood extremely hard but not durable. Weight 58 lbs. per cubic foot.

Sapindus trifoliatus ... Soap-nut Kugati, antavala

The nut commonly used for washing clothes. Flannels may be washed with it without shrinking. Root, bark, fruit, and oil from the seed medicinal. Wood hard, yellow, cross-grained, and not very durable. Weight about 64 lbs. per cubic foot. Occasionally used for carts, but more commonly as handles for axes and similar tools, and for combs.

Saraca indica Asoka

A sacred tree, grown in gardens and near temples for its beautiful flowers, which are a rich orange, changing to dull red. Used also medicinally. The tree is supposed to be a protector of chastity. Sita, the wife of Ráma, when carried off by Rávana, took refuge in a grove of asoka trees.

Sterculia guttata ? Jén-katalu

Bark ash-coloured and very fibrous, used on the Western Coast for making cordage and rough articles of clothing.

Strychnos potatorum ... Clearing-nut tree ... Chillu

The ripened seeds are used for clearing muddy water. A paste of the same removes the pain from the sting of a centipede. Often felled for fuel.

Thespesia populnea ... Portia, tulip-tree ... Huvvarasi

Formerly much planted as an avenue tree, but does not attain perfection so far inland. When raised from seed the timber is free from knots, straight, even-grained, and tough: suitable for carriages and work requiring lightness and pliability. Bark, fruit, and heartwood medicinal.

Wrightia tinctoria Beppále, Hále

Wood highly valued by native turners on account of its ivory-white colour. Used for the celebrated Channapatna toys and for wooden idols. The leaves, which turn black when dry, afford a kind of indigo, called in Mysore *pala* indigo.

Of *fruit trees* grown in native gardens, the following are the more important. Most of them are too well known to need description :—

Anacardium occidentale	...	...	Cashew-nut	...	...	Geru
Anona reticulata	...	...	Bullock's heart	...	...	Rám phal
„ squamosa	...	...	Custard apple	...	...	Sita phal
Artocarpus integrifolia	...	...	Jack	...	...	Halasina mara
Averrhoa carambola	...	...	Carambola	...	...	Kamarak
Carica papaya	...	...	Papay	...	...	Perangi
Citrus aurantium	...	...	Orange	...	...	Kittale
„ decumana	...	...	Pumelo	...	...	Sakóte
„ medica	...	...	Citron	...	...	Mádala
„ „ var. acida	...	...	Lime	...	...	Nimbe
„ „ „ limetta	...	...	Sweet lime	...	...	Gaja nimbe
„ „ „ limonum	...	...	Lemon	...	...	Herile
Cocos nucifera	...	...	Cocoa-nut palm	...	...	Tengina mara
Eriobotrya japonica	...	...	Loquat	...	...	Lakóte
Eugenia jambos	...	...	Rose apple	..	...	Pan merale
Ficus carica	...	...	Fig	...	...	Anjura
Mangifera indica	...	...	Mango	...	...	Mávina mara
Musa sapientum	...	...	Plantain	..	...	Bále
Phyllanthus distichus	...	...	Star-gooseberry	...	...	Kiri nelli
„ „ emblica	...	...	Emblic myrobalan	...	...	Nelli
Psidium guajava	...	...	Guava	...	...	Shépe
Punica granatum	...	...	Pomegranate	...	...	Dálimbe
Pyrus malus	...	...	Apple	...	...	Sévu
Vitis vinifera	...	...	Vine	...	...	Drákshi

The *cashew nut* proper is eaten roasted, and used in native sweetmeats. It yields an oil equal to oil of almonds. From the shell are obtained a black caustic oil, known as cardol, a good preventive of white ants, and anacardic acid, having rubefacient properties. A weak spirit may also be distilled from its juice. Gum obtained from the bark is obnoxious to insect pests. Juice from incisions in the bark forms an indelible marking ink. *Jack fruit* is a favourite article of food among the natives. It is enormous in size and weight, commonly about 20 inches long, and 6 or 8 inches in diameter, weighing 30 to 40 lbs., and grows from the trunk or main limbs with a short stout stalk. The *papay fruit*, something like a small melon, is eaten by all classes, and also pickled. Its juice yields papaine, said to be superior to animal pepsin in its peptonising powers. Meat suspended under the tree becomes tender. The seeds are universally believed to be an effectual emmenagogue and abortive.

The best *oranges* are imported, and are the produce of Sátghur near Vellore, or of the Sherroy Hills, &c. The loose-jacket orange is obtained from Coorg. Of *cocoa-nuts* a rare variety is produced at Honnavalli in Tímúkr District, which, on account of the delicious sweet flavour of its milk, is called Ganga-páni, or water of the Ganges.

The dried kernel of cocoa-nuts, called *kobari*, is a great article of export from the central parts of Mysore.¹

Of *mangoes* there are many varieties, bearing the following names:—*gól káyi* (the most common, roundish), *bádámi* (almond-shaped), *rasapuri* (reddish pulp), *jirige* (has the scent of cummin seed), *pich káyi* (small kind), *kari káyi* (black fibres in the skin), *gini múti* or *gini mávu* (shape of a parrot's beak), *gunge mávu* (generally has a bee in the stone), *sakkare* or *shi mávu* (sweet kind), *chit káyi* (small kind), *hu'i mávu* (used only for pickle). The cultivated kinds, which are propagated by inarching or grafting by approach, have the following names:—*amini*, *bádámi*, *Chittúr*, *dil-pasand*, *Malgova*, *nílam*, *Peterpasand*, *puttu*, *rasapuri*, *Salem*, *sandarsha*. The formation of graft mango plantations has greatly extended during recent years.

Plantains are very plentiful and a favourite article of diet. The most esteemed are *rasa bále* and *rája rasa bále* (with a yellow custard-like pulp), *putta bále* or *putta sugandha bále* (a small sweet plantain, the Guindy plantain), *madhuranga*, *gujja*, *china*, and *gúlúr bále* (all butter plantains), *jénu bále* (honey plantain), *rája bále* (royal plantain), *chandra bále* (red plantain), *sakalíti bále* (red and cottony), *pachcha bále* (green when ripe), *hávu bále* (long and slender), *yelakki bále*, *arisina bále*, *áne bále* (a very large kind), *kalyáni bále* (very large and coarse), *búdi bále* (greyish, used only for cooking), *kádu bále* (the wild plantain).

Guavas, of which there are three or four varieties, white and red, are very plentiful. The grafted kinds are superior. A delicious jelly, closely resembling red currant, is made from the common kind by Europeans.

The *grapes*, though sweet, are small, owing probably to want of attention in thinning out the clusters. Both green and purple varieties are grown. Those from the neighbourhood of Seringapatam are the most highly esteemed. Of imported varieties, fourteen are named in Mr. Cameron's catalogue as in local cultivation. Efforts are being made to extend viticulture. *Apples* are cultivated principally in Bangalore for the European market, and grow to great perfection. The different varieties are distinguished by numbers indicating the order in which they were introduced.

The following are names of *vegetables* of which the leaves are used by natives in curries and stews. Some of these vegetables are cultivated, while others grow wild. The leaves only are used in curries or boiled with chillies to be eaten along with rice.

<i>Eschynomene grandiflora</i>	...	...	...	...	...	Agase soppu
<i>Achyranthes lanata</i>	...	...	...	...	...	Bijí súli „
„ <i>muricata</i>	...	...	...	...	...	Akvi goraji
„ <i>triandra</i>	...	...	...	...	...	Ponnaganti soppu

¹ Further particulars regarding cocoa-nuts will be found under "Cultivation."

Momordica operculata						
Musa sapientum ...	...	...	Plantain ...	...	...	Bále hannu
Solanum melongena ...	...	...	Brinjal ...	...	...	Badane káyi
„ trilobatum ...	...	...	„ ...	...	...	Kákamunchi káyi
„ varietas ...	...	...	„ ...	...	...	Molalu badane
Trichosanthes cucumerina	...	...	„ ...	...	...	Kiri podla káyi
„ nervifolia ...	...	...	„ ...	...	...	Podla káyi
„ palmata ...	...	...	„ ...	...	...	Avagude hannu
Trigonella tetrapetala	...	...	„ ...	...	...	Góri káyi

A few names may be added of plants the roots of which are used in curries. Of these the country or sweet potato grows here to great perfection.

Arum campanulatus	...	...	Arum ...	...	...	Churna gaḍḍe
„ colocasia ...	...	...	„ ...	...	...	Kesave „
Convolvulus batatas	...	...	Sweet potato	...	...	Genasu „
Daucus carota ...	...	...	Carrot ...	...	...	Gájina „
Dioscorea sativa ...	...	...	Yam ...	...	...	Heg-genasu gaḍḍe
Raphanus sativus ...	...	...	Radish ...	...	...	Mullangi „

The Catalogue, which here follows, of plants in the Lal Bagh or Government Botanical Gardens at Bangalore, compiled by Mr. J. Cameron, F.L.S., the Superintendent, will serve to show the capabilities of the climate and the attention bestowed on horticulture :—

Dicotyledons.

Ranunculaceæ.

Clematis, 5 ¹	...	Virgin's bower
Naravelia, 1		
Thalictrum, 1	...	Meadow rue
Delphinium, 2	...	Lárkspur
Nigella, 2	...	Fennel flower
Aquilegia, 2	...	Columbine

Several species of Clematis grow wild in Mysore.

Dilleniaceæ.

Delima, 1		
Dillenia, 3		
Candollea, 1		

Several Dillenia are elegant trees for scenic planting.

Magnoliaceæ.

Magnolia, 3		
Michelia, 2	Champaka	Sampige

The fragrant Champaka is a favourite flower of Indian poetry.

Anonaceæ.

Uvaria, 2		
Artabotrys, 1		
Polyalthia, 2		
Anona, 5	Custard apple	Síta phal

Miliusa, 1	
Saccopetalum, 1	

The custard apple and bullock's heart (Ráma phal) are abundant in many parts.

Menispermaceæ.

Tinospora, 1	
Anamista, 1	
Cocculus, 1	

Berberideæ.

Berberis, 1	
Nandina, 1	

Himalayan plants almost impossible to cultivate here.

Nymphaeaceæ.

Nymphaea, 3	Waterlily...	Távare
Nelumbium, 1	Lotus	Kamala
Victoria, 1	Amazon lily	

Lotus and waterlilies are common in tanks or sacred ponds all over the country.

Papaveraceæ.

Papaver, 5	...	Poppy	...	Gasagase
Argemone, 1				

The cultivation of poppy for opium is prohibited.

¹ These figures show the number of species under each genus.

Fumariaceæ.
 Fumaria, 1 Fumitory

Cruciferae.
 Matthiola, 2 ... Stock
 Cheiranthus, 1 Wallflower.
 Nasturtium, 3... Watercress
 Cardamine, 1 ... Cuckoo flower
 Malcolmia, 1 ... Virginian stock
 Coronopus, 1
 Erysimum, 2
 Brassica, 7 ... Turnip
 Cabbage Mudde kósu
 Mustard Sásiva
 Capsella, 1 ... Shepherd's purse
 Lepidium, 1 ... Garden cress
 Iberis, 1 ... Candytuft
 Raphanus, 1 ... Radish Mullangi

The European vegetables of this order are fully established in the market gardens.

Capparideæ.
 Cleome, 6
 Gynandropsis, 1
 Cratœva, 1 Caper-tree
 Cadaba, 1
 Capparis, 6

Resedaceæ.
 Reseda, 1 Mignonette

Violaceæ.
 Viola, 2 Violet, Pansy
 Ionidium, 1

Bixineæ.
 Cochlospermum, 1
 Bixa, 2 ... Annatto ... Rangumále
 Flacourtia, 3
 Gynocardia, 1
 Hydnocarpus, 1

Pittosporææ.
 Pittosporum, 4
 Billardiera, 1
 Bursaria, 1
 Hymenosporum, 1
 Sollya, 1

Polygaleæ.
 Polygala, 3

Caryophylleæ.
 Dianthus, 5... .. Pink
 Saponaria, 1 ... Soapwort
 Silene, 4 Catchfly
 Lychnis, 2 Champion

Cerastium, 2 ... Chickweed
 Stellaria, 1
 Polycarpœa, 2
 Various strains of pinks do well at Bangalore

Portulacææ.
 Portulaca, 4
 Calandrinia, 1

Tamariscineæ.
 Tamarix, 1

Hypericineæ.
 Hypericum mysorense St. John's wort
 Common at Nandidroog

Guttiferae.
 Garcinia, 4
 Ochrocarpus, 1
 Calophyllum, 2 Pinnay Surahonne,
 oil tree
 Poon tree Kúve, Bobbi
 Mesua, 1... .. Nága sampige
 Pœcilonuron, 1... .. Ballagi
 Clusia, 1
 From the Ballagi tree walking-sticks are made.

Ternstramiaceæ.
 Camellia, 2... .. Tea shrub

Dipterocarpeæ.
 Shorea, 2 ... Lac tree ... Jálári
 Sal tree
 Hopea, 2
 Vateria, 1 ... Indian Dhúpada
 Copal tree mara

Malvaceæ.
 Althœa, 2 ... Hollyhoek Dodða
 bindige
 Lavatera, 1
 Malva, 3 Sanna
 bindige
 Malvastrum, 2
 Sida, 7
 Abutilon, 6 Tutti
 Malachra, 1
 Urena, 2
 Pavonia, 2
 Decaschistia, 2
 Hibiscus, 23... Shoe-flower Dásála
 Rozelle ... Kempu
 pundrike

Paritium, 1
 Thespesia, 2

Gossypium, 5 Cotton ... Arale
 Kydia, 1
 Adansonia, 1 Baobab
 Bombax, 1 Kempu
 búruqa
 Eriodendron, 1 Biji búruqa
 Lagunaria, 1
 Durio, 1 ... Durian

Under *Abutilon* 12 garden varieties are enumerated. Under *Gossypium* the cottons known as Hinginghaut, Dacca, Berar, Upland Georgian, and China are varieties of *herbaceum*; those known as Barbadoes, Bourbon, New Orleans, and Sea-Island are from *barbadense*.

Sterculiaceæ.

Sterculia, 8
 Cola, 1
 Heritiera, 2
 Kleinhovia, 1
 Helicteres, 2... Indian ... Yedamuri
 Screw-tree
 Pterospermum, 1
 Eriolæna, 1
 Pentapetes, 1
 Melhania, 2
 Dombeya, 1
 Melochia, 1
 Waltherja, 1
 Abroma, 1
 Guazuma, 1 ... Bastard ... Rudrâkshi
 cedar
 Theobroma, 1 Chocolate-tree

Tiliaceæ.

Berry, 1
 Grewia, 9 Bútâle,
 Tadasalu
 Triumphetta, 3
 Corchorus, 4 Jute plant
 Elæocarpus, 2

The genus *Grewia* is well represented in the reserved jungles of Mysore, where some of the climbing species form dense thickets for the preservation of wild animals. The jute plant is found only rarely in local cultivation.

Linææ

Linum, 2 ... Flax plant
 Rienwardtia, 1

Erythroxylon, 2 Bastard Devadâru
 sandal

Cocaine is the active principle of the leaf of *E. coca*.

Malpighiaceæ.

Malpighia, 3
 Hiptage, 2
 Aspidopterys, 1
 Banisteria, 1
 Stigmatophyllum, 1

Zygophylleæ.

Tribulus, 2 Sanna neggilu
 Guaiacum, 1
 Melianthus, 1

The herb *sanna neggilu* is well known for its medicinal properties. The introduced tree, *G. officinale*, yields the valuable wood known as *lignum vite*.

Geraniaceæ.

Pelargonium, 3 Garden geranium
 Oxalis, 4 ... Wood sorrel
 Biophytum, 2
 Averbhoa, 2 Komarak,
 Bilimbi
 Impatiens, 7
 Tropæolum, 3
 Hydrocera, 1

Rutaceæ.

Ruta, 1 ... Common ... Hávu-nan-
 rue jina gida
 Zanthoxylum, 2
 Toddalia, 1 Kâdu
 menasu
 Glycosmis, 1
 Murraya, 2 ... China box Angâraka
 Curry-leaf tree Kari bevu
 Clausena, 2
 Triphasia, 1
 Limonia, 2
 Atalantia, 2
 Citrus, 6 ... Citron ... Mâdavâla
 Lemon ... Herale
 Lime ... Nimbe
 Orange ... Kittale
 Pummelo ... Sakotti
 Feronia, 1 ... Wood-apple Bêlada
 mara
 Ægle, 1 ... Bael-tree ... Bilvapatre
 Calodendrum, 1

The foetid herb *R. graveolens* is said to be obnoxious to snakes, and is often cultivated near dwellings on that account.

Simarubææ.

- Ailantus, 1
 Balanites, 1 Ingalika
 Quassia, 1 ... Quassia shrub

Ochnæææ.

- Ochna, 2

Burseræææ.

- Boswellia, 2 Sámráni
 Garuga, 1
 Balsamodendron, 2
 Protium, 1
 Bursera, 1
 Filicium, 1

Meliæææ.

- Naregamia, 1
 Melia, 3 ... Neem-tree... Bevu
 Cipadessa, 1
 Walsura, 1
 Soyimida, 1 Svámi
 Chickrassia, 1 Chittagong wood
 Cedrela, 1 ... White cedar Noge
 Chleroxylon, 1 Satin wood Huragalu
 Swietenia, 2 ... Mahogany

Olacineææ.

- Ximenia, 1
 Olax, 1
 Opilia, 1

Ilicineææ.

- Ilex, 2
 Europe holly does not succeed at Bangalore, but the Chinese species is not a bad substitute.

Celastrineææ.

- Euonymus, 3
 Celastrus, 1 Kangondi
 Gymnosporia, 2 Tandrasí
 Elæodendron, 1 Mukkarive

Rhamneææ.

- Ventilago, 1 Popli
 Zizyphus, 4 ... Bhere fruit Yelachi
 Rhamnus, 2
 Scutia, 1 Kurudi
 Colubrina, 1

The root bark of Popli affords a good orange dye.

Ampelideææ.

- Vitis, 12 ... Grape vine Drákshigida
 Leea, 1
 Ampelopsis, 1 Virginia creeper

Of the varieties of grape in local cultivation 16 are named.

Sapindæææ.

- Cardiospermum, 1
 Allophylus, 1
 Sapindus ... Soap-nut... Kúgati tree
 Nephelium, 3 Litchi
 Dodonæa, 1
 Melianthus, 1
 Paullinia, 1

Anacardiæææ.

- Rhus mysorensis Native sumach
 Pistacia, 1
 Mangifera, 2... Mango ... Mávu
 Anacardium, 1 Cashew-nut Turuka Geru mara
 Buchanania, 1
 Odina, 1
 Semecarpus, 1 Marking-nut Geru mara
 Spondias, 3 ... Hog-plum ... Amate
 Schinus, 1 ... Bastard pepper

Moringeææ.

- Moringa, 1 ... Horse-radish- Nuggé tree

*Leguminosææ.**(Papilionacææ)*

- Genista, 1 ... Spanish broom
 Rothia, 1
 Heylandia, 1
 Crotalaria, 19 Sanabu
 Trifolium, 2 ... Clover
 Trigonella, 1... Fenugreek Mentya
 Medicago, 4 ... Lucerne
 Cyamopsis, 1
 Lupinus, 5
 Indigofera, 9 Indigo ... Nili gida
 Mundulea, 1
 Tephrosia, 6
 Sesbania, 5 Jinangi
 Hedysarum, 1
 Zornia, 1
 Stylosanthes, 1
 Æschynomene, 2
 Ormocarpum, 1
 Eleiotis, 1
 Pseudarthria, 1
 Uraria, 1
 Lowria, 1
 Alysicarpus, 2
 Desmodium, 8 Sensitive plant

Abrus, 1 ... Wild liquor-ice	Guraganji	Peltophorum, 1	
Cicer, 1 ... Bengal gram	Kadale	Mezoneurum, 1	
Vicia, 2 ... Bean		Pterolobium, 2	
Ervum, 1 ... Lentil		Poinciana, 2... Gold-mohur tree	
Arachis, 1 ... Ground-nut	Nela	Parkinsonia, 1 Jerusalem thorn	
	kadale	Wagatea, 1	
Lathyrus, 1 ... Sweet pea		Gleditschia, 1 Honey locust	
Pisum, 2 ... Garden pea		Cassia, 17 ... Indian laburnum	Kakke
Glycine, 2 Kád-avare			Tangadi
Teramnus, 1			cassia
Mucuna, 4 ... Cowitch		Hardwickia, 1 Karachi	
Erythrina, 8 ... Indian coral	Varjipe	Saraca, 1 ... Asoka ... Asoka	
Galactia, 1		Amherstia, 1	
Butea, 2 ... Pulas kino	Muttuga	Tamarindus, 2 Tamarind ... Hunise	
Canavalia, 3 Sword bean		Hymenœa, 1 .. Locust-tree	
Phaseolus, 8 ... Kidney bean	Hurali	Humboldtia, 1	
	kayi	Bauhinia, 13... Camel's foot	Kanchi-vála
	Green gram		
Vigna, 1 Alasandi		Hæmatoxylon, 1 Logwood	
Pachyrhizus, 1		Colvillea, 1	
Clitoria, 4		Ceratonia, 1	
Dolichos, 3 ... Cow gram... Avare		Louhocarpus, 1	
	Horse gram		(Mimoseæ)
Psophocarpus, 1		Neptunia, 1	
Atylosia, 3		Adenanthera, 1 Redwood ¹ ... Manjatti	
Cajanus, 1 ... Dholi ... Togari		Prosopis, 2	
Cylista, 1		Dichrostachys, 1	
Rhynchosia, 6		Parkia, 1	
Flemingia, 2		Desmanthus, 1	
Dalbergia, 8 ... Rosewood... Bîridi		Leucæna, 1	
Pterocarpus, 2 Kino ... Hõnne		Mimosa, 2	
Pongamia, 1 ... Indian beech	Hõnge	Acrocarpus, 1 Shingle-tree	Haulige
Derris, 2		Acacia, 18 ... Babool ... Jáli	
Sophora, 2			Mugali
Virgilia, 1			Kaggali
Goodia, 1			Soap-nut ... Sige gida
Templetonia, 1		Albizzia, 5 Bâge	
Swainsonia, 1			Sujjalu
Myrospermum, 2 Myroxylon		Pithecolobium, 3 Rain-tree	
Viminaria, 1			Korakapulli Sime
Clianthus, 2			hunise
Robinia, 1			
Cartanospermum, 1			
Brownea, 2			
	(Cæsalpinia).		
Cæsalpinia, 10 Sappanwood			
	Mysore thorn		
	Kurudu		
	gajjige		

¹ The scarlet seeds, each supposed to equal 4 grains exactly, used by goldsmiths and others as weights. Also worn as necklaces. The paste from the heartwood applied by Brahmans to the forehead after bathing.

Rosaceæ.

- Prunus, 4 ... Peach, Plum
 Spiræa, 1
 Rubus, 3 ... Raspberry
 Fragaria, 1 ... Strawberry
 Poterium, 1
 Rosa, 17 ... Rose ... Gulábi
 Eriobotrya, 1 Loquat ... Lakkoti
 Pyrus, 2 ... Apple, Pear Sévu

Of roses 258 varieties are named as cultivated in Bangalore.

Saxifragaceæ.

- Saxifraga, 1
 Vahlia, 1
 Hydrangea, 1

Crassulaceæ.

- Tillæa, 1
 Bryophyllum, 1
 Kalanchoe, 4
 Cotyledon, 4
 Sedum, 1
 Echeveria, 1

Droseraceæ.

- Drosera, 1 ... Indian Sundew

Haloragaceæ.

- Myriophyllum, 1

Combretaceæ.

- Terminalia, 9 Myrobalan Táre,
 Arale káyi
 Anogeissus, 1 ... Dindiga
 Combretum, 5
 Poivreá, 1
 Quisqualis, 1 Rangoon creeper

Myrtaceæ.

- Melaleuca, 2
 Tristania, 2
 Callistemon, 2
 Eucalyptus, 15 Gum tree
 Myrtus, 1 ... Myrtle
 Psidium, 4 ... Guava ... Chépe
 Eugenia, 7 ... Rose-apple Pannerale
 Jamoon ... Náyi nerale
 Barringtonia, 1
 Careya, 1
 Couroupita, 1

Melastomaceæ.

- Osbeckia, 2
 Melastoma, 1 Indian rhododendron
 Sonerila, 1

Heterotrichum, 1

Memecylon, 3

Lythraceæ.

- Ammannia, 5
 Lawsonia, 1 ... Henna ... Goranti
 Lagerstroemia, 4 ... Nandi
 Punica, 3 ... Pomegranate Dálimbe
 Lafaensia, 1
 Heimia, 1
 Cuphea, 2

Onagraceæ.

- Jussiaea, 2
 Ludwigia, 1
 Clarkia, 2
 Godetta, 4
 Enothera, 2
 Fuchsia, 3
 Napa, 1 ... Water chestnut

Passifloreæ.

- Passiflora, 12 ... Passion-flower
 Tacsonia, 3
 Modecca, 1
 Carica, 1 ... Papay ... Parangi

Cucurbitaceæ.

- Trichosanthes, 3 Snake gourd Padavalu
 Lagenaria, 1 ... Bottle gourd Sore
 Luffa, 4
 Benincassa, 1
 Momordica, 3
 Cucumis, 3 ... Melon ... Kekkarike
 Cucumber ... Savute
 Citrullus, 2 ... Colocynth
 Water melon Karbuj
 Cephalandra, 1
 Cucurbita, 3 ... Gourd ... Kumbala
 Bryonia, 1
 Mukia, 1
 Zehneria, 1
 Rhynucarpa, 1
 Zanonía, 1

Begoniaceæ.

Begonia, 27

Cacteeæ.

- Opuntia, 5 ... Prickly pear Pápás
 kattáli
 Cochineal plant
 Melocactus, 2
 Cereus, 9 ... Night-flowering cactus
 Echinocactus, 1
 Epiphyllum, 2
 Pereskia, 1

Ficoideæ.

- Trianthema, 3
 Orygia, 1
 Mollugo, 4
 Tetragonia, 1
 Mesembryanthemum, 1 Ice plant

Umbelliferae.

- Hydrocotyle, 2 Indian pennywort
 Apium, 2 ... Celery, parsley
 Carum, 4 ... Caraway
 Bishop's ... Omu
 weed
 Pimpinella, 2
 Foeniculum, 1
 Polyzygus, 1
 Anthriscus, 1 Chervil
 Pencedanum, 1 Dill
 Coriandrum, 1 Coriander ... Kottumbari
 Cuminum, 1 ... Cummin seed Jirige
 Daucus, 1 ... Carrot ... Gájina
 gadde
 Partinaca, 1 ... Parsnip
 Arracacia, 1
 Heracleum, 1

Araliaceæ.

- Aralia, 8 ... Rice-paper plant
 Panax, 9
 Heptapleurum, 1
 Brassaia, 2
 Hedera, 1 ... Ivy
 Many varieties of Panax are cultivated
 in gardens for their foliage.

Cornaceæ.

- Alangium, 1 Ankole
 Cornus, 1
 Benthamia, 1

Caprifoliaceæ.

- Lonicera, 2 ... Woodbine

Rubiaceæ.

- Sarcocephalus, 1
 Anthocephalus, 1
 Adina, 1 Báchanige
 Stephegyne, 1 Kadaga
 Nauclea, 1 Yettaka
 Wendlandia, 2
 Hedyotis, 1
 Oldenlandia, 3
 Mussenda, 1
 Webera, 1 Pápati
 Randia, 2 Mangáre

- Gardenia, 4
 Knoxia, 1
 Canthium, 2 Káre
 Vangueria, 1
 Ixora, 7 ... Torch-tree... Gorivi
 Pavetta, 1
 Coffea, 2 ... Coffee ... Kápi
 Morinda, 2
 Psychotria, 1
 Spermacece, 1
 Rubia, 2 ... Madder
 Pentas, 1
 Hamelia, 1
 Cinchona, 4
 Rondeletia, 1
 Manettia, 1
 Catesbœa, 1
 Hoffmania, 1

Dipsaceæ.

- Dipsacus, 1 ... Fuller's teazel
 Scabiosa, 4

Compositæ.

- Centratherum, 1
 Vernonia, 5 ... Speedwell
 Elephantopus, 1
 Adenostemma, 1
 Ageratum, 2
 Solidago, 1
 Eupatorium, 2
 Dichrocephala, 1
 Grangea, 1
 Brachycome, 2
 Aster, 3
 Callistephus, 1
 Erigeron, 1
 Conyza, 1
 Blumea, 6
 Laggera, 1
 Pluchea, 2
 Sphæranthus, 3 ... Múdagattina
 soppu
 Bodukadále soppu
 Often mixed with stored grain to pre-
 serve the latter from the attacks of
 insects.
 Filago, 1
 Anaphelis, 1
 Gnaphalium, 2
 Helichrysum, 2 Everlasting
 Vicoa, 1
 Lagascea, 1

Xanthium, 1
 Siegesbeckia, 1
 Eclipta, 1 ... Garugalu soppu
 Blainvillea, 1
 Wadelia, 1
 Spilanthus, 3... ... Muguli
 Guizotia, 1 ... Foolish oil... Huchch-
 plant ellu
 Bidens, 1 ... Bur marigold
 Achillea, 1 ... Milfoil
 Chrysanthemum, 4 Sevantige
 Cotula, 1
 Artemisia, 3 ... Wormwood
 Gynura, 1
 Emilia, 1
 Notonia, 1
 Seneico, 4 Kadu gobi
 Calendula, 1... Marigold
 Echinops, 1
 Tricholepis, 2
 Centaurea, 4... Cornflower
 Carthamus, 1 Safflower ... Kusumba
 Dicoma, 1 Sanni
 Cichorium, 2 Succory, Endive
 Taraxacum, 1 Dandelion
 Lactuca, 2 ... Lettuce
 Sonchus, 1 ... Sow thistle
 Farfugium, 3
 Flauria, 1
 Zinnia, 4
 Argyranthemum, 1
 Cosmos, 1
 Cacalia, 1
 Gaillardia, 3
 Gazania, 1 ... Treasure flower
 Helenium, 1
 Tagetes, 3 ... African and French
 marigold
 Calliopsis, 4
 Bellis, 2 ... Daisy
 Cineraria, 1
 Sanvitalia, 1 ...
 Pyrethrum, 3 Feverfew
 Cynara, 1 ... Globe artichoke
 Dahlia, 1
 Helianthus, 4 Sunflower ... Súra
 kánti
 Jerusalem artichoke
 Polymnia, 1
 Vittadenia, 1 Australian daisy
 Verbesina, 1

Campanulaceae.

Pratia, 1
 Lobelia, 11
 Cephalostigma, 2
 Wahlenbergia, 1
 Sphenoclea, 1
 Campanula, 5 ... Harebell
 Trachelium, 1 ... Throatwort

Plumbaginaceae.

Plumbago, 3... Leadwort ... Chitra-
múla

Primulaceae.

Primula, 1 Primrose
 Anagallis, 1 ... Pimpernel
 Cyclamen, 1 ... Sow bread

Myrsinaceae.

Maesa, 1
 Embelia, 1
 Ardisia, 4
 Jacquinia, 3..

Sapotaceae.

Chrysophyllum, 1 Star-apple
 Sideroxylon, 1 ... Iron wood
 Bassia, 2 ... Mahwa ... Ippe
 Mimusops, 2 Pagadi
 Achras, 1 ... Sapod illa

Ebenaceae.

Diospyros, 6... Ebony ... Bale

Oleaceae.

Jasminum, 15 Jasmine ... Mallige
 Nycthanthes, 1 Párijáta
 Olea, 2 ... Olive
 Ligustrum, 1... Indian privet
 Myxopyrum, 1
 Noronhia, 1

Salvadoraceae.

Azima, 1 - Bili uppi

Apocynaceae.

Carissa, 4 Korinda
 Ranwolfia, 1
 Cerbera, 1
 Kopsia, 1 ...
 Vinca, 3 Periwinkle. Kási gana-
 galu
 Plumiera, 3 ... Pagoda-tree Deva gana-
 galu
 Alstonia, 2 Jantala
 Holarrhena, 1
 Tabernaemontana, 3... ... Nandi
 batlu

Vallisneria, 1 Bugadi
 Wrightia, 2 ... Ivory wood Beppále
 Nerium, 3 ... Oleander .. Ganagalu
 Beaumontia, 2
 Thevetia, 1 ... Exile tree
 Allamanda, 4
 Ichnocarpus, 1
 Roupellia, 1
 Dipladenia, 1
 Echites, 2
 Landolphia, 3
 Rhyncospermum, 1
 Adenum, 1

Asclepiadaceæ.

Hemidesmus, 1 Bastard sar- Sugandhi
 saparilla
 Cryptolepis, 2
 Cryptostegia, 1
 Secamone, 1... .. Síránige
 Oxystelma, 1
 Calotropis, 3... Mudar ... Yekke
 Asclepias, 1 ... Swallowwort
 Dæmia, 1 Juttuve
 Cynanchum, 2.
 Sarcostemma, 1 Hambu
 kalli
 Gymnema, 1
 Pergularia, 1
 Stephanotis, 1
 Tylophora, 4
 Hoya, 5 ... Waxflower
 Leptadenia, 1
 Brachystelma, 1
 Ceropegia, 5
 Gomphocarpus, 1
 Caralluma, 2
 Boucerosia, 2

Loganiaceæ.

Mitrasacme, 1
 Buddleia, 1
 Fagraea, 1
 Strychnos, 2... Nux vomica Nanjina
 koradu

Gentianaceæ.

Exacum, 2
 Hoppea, 2
 Erythraea, 1
 Canscora, 2
 Limnanthemum, 2

Polemoniaceæ.

Phlox, 3
 Cobæa, 1

Hydrophyllaceæ.

Wigandia, 1
 Hydrolea, 1
 Nemophila, 1

Boraginææ.

Cordia, 4 Tapasi
 Ehretia, 5
 Coldenia, 1
 Heliotropium, 3 Heliotrope
 Trichodesma, 3
 Anchusa, 1 ... Alkanet
 Myosotis, 2 ... Forget-me-not
 Symphytum, 1 Prickly comfrey
 Borago, 1 ... Borage
 Cynoglossum, 1

Convolvulaceæ.

Erycibe, 1
 Rivea, 2
 Argyreia, 6 ... Elephant ... Samudra-
 creeper pála balli
 Lettsomia, 2
 Ipomæa, 23 ... Moonflower creeper
 Morning glory
 Hewittia, 1
 Convolvulus, 5 Scammony
 Exogonium, 1 Jalap
 Jacquemontia, 1
 Evolvulus, 1
 Porana, 1
 Cuscuta, 1

Solanaceæ.

Solanum, 14 ... Nightshade Káchi
 Brinjal, egg- Badane
 plant
 Potato ... Urala gadde
 Cythomandra, 1
 Lycopersicum, 1 Tomato
 Physalis, 2 ... Cape gooseberry
 Capsicum, 5 ... Chilli ... Menasu
 Withania, 1
 Nicandra, 1
 Datura, 5 ... Thorn-apple Ummatti
 Brugmansia, 1 Trumpet flower
 Hyoscyamus, 1 Henbane
 Petunia, 3
 Habrothamnus, 1
 Nicotiana ... Tobacco ... Hoge
 soppu

Scrophularinææ.

Verbascum, 1 ... Mullein
 Celsia, 1.
 Linaria, 2 Toad-flax

Antirrhinum, 1 ... Snap-dragon
 Mimulus, 3... ... Monkey flower
 Limnophyla, 2
 Herpestis, 1
 Torenia, 2 Sispara creeper
 Vandellia, 4
 Ilysanthes, 2
 Veronica, 1... ... Speedwell
 Striga, 1
 Rhamphicarpa, 1
 Sopubia, 2
 Maurandia, 3
 Penstemon, 5
 Angelonia, 2
 Browallia, 2
 Lophospermum, 1
 Collinsia, 2
 Calceolaria, 1 ... Slipperwort
 Paulownia, 1
 Russellia, 2
 Brunfelsia, 1
 Franciscea, 2
 Sanchezia, 2

Calceolaria is not successfully cultivated at Bangalore.

Orobanchaceæ.

Æginetia, 2
 Orobanche, 2

Lentibulariaceæ.

Utricularia, 2

Gesneraceæ.

Æschynanthus, 2
 Klugia, 1
 Gesnera, 6
 Achimenes, 3
 Gloxinia, 4
 Streptocarpus, 1

Bignoniaceæ.

Millingtonia, 1 Indian cork- Biratu
 tree
 Oroxyllum, 1
 Bignonia, 3 ... Trumpet-flower
 Tecoma, 7
 Dolichandrone, 1
 Spathodea, 1
 Heterophragma, 1
 Stereospermum, 4 Pádar
 Amphilophium, 1
 Catalpa, 1
 Crescentia, 1 Calabash-tree

Kigelia, 1

The *spathodea*, when in flower, is one of the handsomest trees in our parks and gardens.

Pedaliaceæ.

Pedaliium, 1
 Sesamum, 2 ... Gingelli ... Olle yellu
 Martynia, 2

Acanthaceæ.

Thunbergia, 11
 Nelsonia, 1
 Hygrophila, 2
 Calophanes, 1
 Ruellia, 3
 Phayloopsis, 1
 Dædalacanthus, 2
 Hemigraphis, 1
 Strobilanthes, 8
 Blepharis, 2
 Acanthus, 1
 Barleria, 9
 Crossandra, 1
 Asystasia, 2
 Eranthemum, 10
 Andrographis, 2 Nela vembu
 Gymnostachyum, 1
 Lepidagathis, 2 Gantu kálu
 Justicia, 8
 Adhatoda, 1
 Rhinacanthus, 1
 Ecbolium, 1
 Graptophyllum, 3
 Rungia, 2
 Dicliptera, 2
 Peristrophe, 3
 Cyrtanthera, 2
 Aphilandra, 1
 Meyenia, 2
 Fittonia, 2

Verbenaceæ.

Lantana, 2
 Lippia, 1 Kere
 hippali
 Stachyturpheta, 2 Bastard Vervain
 Priva, 1 Sirantu
 Verbena, 4
 Callicarpa, 1
 Tectona, 2 ... Teak-tree ... Téгада
 mara
 Premna, 1 Nárave
 Gmelina, 2 Kúli
 Vitex, 4 ... Chaste-tree Nekkilu

Elæagnaceæ.

Elæagnus, 2 Hejjála

*Loranthaceæ.*Loranthus, 4... .. Badanike
Old mango-trees in Mysore are much infested by these mistletoes.*Santalaceæ.*Santalum, 1 ... Sandalwood Srí gandha
The most valuable tree in Mysore.*Euphorbiaceæ.*Euphorbia, 10 Milk hedge Kalli
Buxus, 1
Bridelia, 1. Gurige
Phyllanthus ... Gooseberry... Nelli
treeGlochidion, 1
Flueggia, 1
Brennia, 1 Súfi
Putranjiva, 1
Antiderma, 1
Jatropha, 7 ... Physic-nut
Manihot, 1 ... Ceara rubber
Tapioca
Aleurites, 1 ... Belgaum walnut
Croton, 1 ... Croton oil... Jápála
plant

Of so-called garden crotons, which properly belong to the genus *Codiaeum*, 122 varieties are named as cultivated at Bangalore.

Givotia, 1
Codiceum, 1
Chrozophora, 1
Acalypha, 7 Kuppi
Trewia, 1.
Mallotus, 1 ... Kamala dye Kunkumada
mara
Ricinus, 2 ... Castor-oil ... Haralu
plant
Gelonium, 1
Tragia, 1
Dalechampia, 1
Sapium, 2 ... Tallow-tree
Excoecaria, 1
Baloghia, 1
Poinsettia, 2... Sand box-tree
Hura, 1
Anda, 1
Hevea, 2 ... Para rubber
Xylophylla, 1Pedilanthus, 2
Synadenium, 1*Urticeæ.*Celtis, 1 Bendu
Trema, 1 ... Charcoal- ... Gorklu
tree
Humulus, 1 ... Hop
Cannibis, 1 ... Hemp ... Bangi soppu
Cultivation prohibited in Mysore.
Streblus, 1 Mitli
Broussonetia, 1 Paper mulberry
Morus, 5 ... Mulberry Reshme gida,
Kambali gida
Dorstenia, 1
Ficus, 25 ... Banyan Alada mara,
Goni mara
Pipal Asvatha, arali
mara
Basuri mara
Country fig Atti mara

Goni mara (*F. mysorensis*) is the largest species in the Mysore country. Specimens are not unusual with trunk 30 feet circumference, and head 140 feet diameter. The Java fig (*F. Benjamina*) and Moreton Bay chestnut (*F. macrophylla*) are highly ornamental trees.

Artocarpus, 4 Jack-tree ... Halasina
maraUrtica, 1 ... Nilgiri nettle
Fleurya, 1
Girardinia, 1
Pilea, 1
Boehmeria, 3... Rhea Fibre or
Grass-cloth plantPouzolzia, 1
Debregeasia, 1*Platanaceæ.*

Platanus, 1 ... Oriental plane

*Casuarineæ.*Casuarina, 7... .. Kesarike
C. equisetifolia is very extensively cultivated as a fuel-tree.*Cupulifera.*Quercus, 1 ... Oak
Will hardly grow here*Salicaceæ.*

Salix, 2 ... Willow ... Niravanji

Ceratophylleæ.

Ceratophyllum, 1

Gymnospermæ.

<i>Conifere.</i>		Wellingtonia, 1 ... Mammoth-tree
Cupressus, 7 ... Cypress		Cryptomeria, 1
Juniperus, 1 ... Juniper		Thuja, 1 ... Arbor vite
Podocarpus, 2		Retinospara, 3
Dammara, 2 ... New Zealand pine		
Pinus, 2 ... Cheer pine		<i>Cycadaceæ.</i>
Frenela, 2 ... Tasmanian pine		Cycas, 5
Araucaria, 4 ... Pines		Macrozamia, 1
Abies, 2 ... Spruce		Encephalartus, 1

Monocotyledons.

<i>Hydrocharideæ.</i>		Amomum, 1
Hydrilla, 1		Elettaria, 2 ... Cardamom Yelakki
Lagarosiphon, 1		(Marantaceæ.)
Vallisneria, 1		Maranta, 21
Blyxa, 1		Canna, 10 ... Indian shot
Ottelia, 1		(Musaceæ.)
<i>Orchideæ.</i>		Musa, 5 ... Plantain ... Bále gida
Dendrobium, 37		Of <i>M. paradisiaca</i> 15 varieties are named as in local cultivation.
Bulbophyllum, 2		Heliconia, 2
Eria, 3		Strelitzia, 1
Phajus, 3		Ravenala, 1 ... Travellers' tree
Cœlogyne, 7		<i>Iridæceæ.</i>
Pholidota, 2		Gladiolus, 5 ... Corn flag
Calanthe, 2		Iris, 3 ... Fleur-de-lis
Arundina, 1		Tigridia, 1 ... Tiger flower
Cymbidium, 3		Pardanthus, 1 ... Leopard flower
Eulophia, 1		Antholyza, 1.
Cyrtopera, 1		<i>Amaryllideæ.</i>
Phalenopsis, 2		Crinum, 7
Ærides, 5		Pancratium, 1
Vanda, 6		Nerine, 1 ... Guernsey lily
Saccolabium, 6		Amaryllis, 5 ... Mexican lily
Vanilla, 2		Eucharis, 2 ... Amazon lily
Cultivated at Bangalore for its fruit.		Zephyranthes, 3 American crocus
Pogonia, 1		Curculigo, 2
Habenaria, 1		Cyrtanthus, 1
Cypripedium, 4 ... Lady's slipper		Hæmanthus, 3 Blood flower
Angræcum, 1		Doryanthes, 1
Bletia, 1		Agave, 6 ... American aloe Kattáli
Oncidium, 1		Fourcroya, 4
A number of orchids are still undetermined.		<i>Bromeliaceæ.</i>
<i>Scitamineæ.</i>		Æchmea, 2
(Zingiberaceæ.)		Ananassa, 2 ... Pine apple Ananás
Alpinia, 5		Billbergia, 1
Zingiber, 2 ... Ginger ... Sonti		Tillandsia, 2
Costus, 2		Pitcairnia, 2
Kæmpferia, 2 Indian crocus		Bromelia, 1
Hedychium, 4 Garland flower		
Curcuma, 4 ... Turmeric... Arisina gida		

- Dioscoreaceae.*
 Dioscorea, 8 Yam
- Smilacæ.*
 Smilax, 3 ... Sarsaparilla
- Philesiaceae.*
 Lapageria, 2
- Liliaceae.*
 Liliium, 5 ... Lily
 Succeed indifferently at Bangalore.
 Gloriosa, 1 Karadi kan-
 nina gida
- Agapanthus, 2 African blue lily
 Hemerocallis, 1 Day lily
 Anthericum, 2 St. Bruno's lily
 Tulipa, 2 ... Tulip
 Polianthes, 2
 Ornithogalum, 1 Star of Bethlehem
 Sanseveira, 3 Bow-string Manju
 hemp
- Allium, 5 ... Onion ... Iruilli
 Garlic ... Bellulli
- Asparagus, 4 Majjige
 Aspidistra, 3
 Dracæna, 20... Dragon's blood
 Very useful for decorative purposes.
 Phormium, 2 New Zealand flax
 Aloe, 3 ... Hedge aloe
 Yucca, 5 ... Adam's needle
 Eustrephus, 1
- Pontederiaceae.*
 Monochoria, 2
- Commelynageae.*
 Cyanotis, 2
 Commelyna, 4
 Aneilemma, 1
 Nadescantia, 4
- Palmaceae.*
 Areca, 7 ... Areca-nut ... Adike
 Arenga, 1 ... Sugar palm
 Borassus, 1 ... Palmyra palm Tále
 Caryota, 4 ... Sago palm Bagani
 Chamærops, 3
 Cocos, 2 ... Cocoa-nut... Tengina
 mara
 Several distinct varieties are cultivated.
 Corypha, 2 ... Fan palm
 Phoenix, 9 ... Date palm... Karjūra
 Toddy palm Ichalu
 Sabal, 2 ... Palmetto
- Seaforthia, 1
 Livistona, 2
 Licuala, 2
 Calamus, 6 ... Rattan-cane palm
 Elæcis, 1
 Oreodoxa, 1
 Kentia, 1
 Thrinax, 3
 Rhapis, 1 ... Ground rattan
 Hyophorbe, 1
 Dictyosperma, 1
 Dypsis, 1
 Wallichia, 1
- Alismaceae.*
 Sagittaria, 1
- Pandanaceae.*
 Pandanus, 4 ... Screw pine Gedige
- Typhaceae.*
 Typha, 2 ... Elephant ... Jambu
 grass hullu
- Aroideae.*
 Acorus, 2 ... Sweet flag
 Calla, 1 ... Arum lily
 Aglaonema, 3
 Alocasia, 18
 Amorphophallus, 3
 Anthurium, 13
 Arisæma, 2 ... Snake lily
 Arum, 2 ... Lords and ladies
 Caladium, 46
 Grow to great perfection in Bangalore.
 Dieffenbachia, 12
 Philodendron, 5
 Pothos, 5
 Syngonium, 3
 Curmeria, 1
- Pistiaceae.*
 Pistia, 1 ... Water soldier
 Lemna, 1 ... Duckweed
- Eriocauloneae.*
 Eriocaulon, 2
- Cyperaceae.*
 Cyperus, 18 Jambu hullu
 Timbristylis, 6 ... Sabbasige hullu
 Isolepis, 3 Usumani hullu
 Scirpus, 1 Club-rush Hommugali
 hullu
 Courtoisia, 1
 Tuirena, 2 Petlugori hullu
 Kyllingia, 1 ... Anantagonde hullu

Gramineæ.

- Triticum, 1 ... Wheat ... Godhi
 Oryza, 1 ... Rice ... Nellu
 There are specimens of 108 varieties
 in the Bangalore Museum.
 Zea, 1 ... Maize ... Jola
 ... Indian corn
 Euchlæna ... Teosinte
 Paspalum, 2 ... Sanna tapri
 hullu
 Panicum, 21 ... Little millet Baragu
 Italian millet Navane
 Sáme
 Háraka
 Pencilaria, 1... Spiked millet Sajje
 Setaria, 4 ... Korle
 hullu
 Saccharum, 2... Sugar-cane Kabbu
 Andropogon, 5.. Lemongrass Nese hullu
 Lavanchi
 hullu
 Kási hullu
 Kuskus ... Ganjalu ga-
 grass rika hullu
 Sorghum ... Great millet Bili jola
 Cymbopogon, 1 ... Dodda kási
 hullu
 Chrysopogon, 2
 Coix, 1 ... Job's tears
 Apluda, 1
 Anatherium, 1
 Aristida, 4 ... Broom ... Hanchi
 grass hullu
 Cynodon, 1 ... Hariáli, or... Garike
 doub grass hullu
 The best Indian grass for making hay.

- Chloris, 1
 Microchlon, 1
 Lappago, 1
 Isachne, 1
 Sporobolus, 2... Fox-tail grass
 Oplismenus, 4
 Manisurus, 1
 Batratherum, 1
 Trachys, 1
 Dactyloc- ... Buffalo-head grass
 tenium, 1
 Leptochloa, 2
 Perotis, 1
 Eragrostis, 11
 Leersia, 1
 Chamæraphis, 1
 Imperata, 1
 Gymnothrix, 1 Nose hullu
 Spodiopogon, 1
 Heteropogon, 1
 Elytrophorus, 1
 Anthisteria, 1
 Hemarthria, 1
 Arundinella, 2
 Eleusine, 2 ... Rági ... Rági
 The staple grain of Mysore.
 Avena, 1 ... Oat grass
 Briza, 1 ... Quaking grass
 Dactylis, 1 ... Cock's-foot grass
 Lolium, 1 ... Darnel rye grass
 Heleochloa, 1 ... Jandu hullu
 (Bambusaceæ.)
 Dendrocalamus, 1
 Arundinaria, 2
 Bambusa, 5 ... Bamboo ... Bidiru
 Beesha, 2 ... Quill bamboo

Cryptogams.

Filices.

- Acrostichum, 8
 Actinopteris, 1
 Adiantum, 32 ... Maiden-hair fern
 Alsophila, 1 ... Tree fern
 Anemia, 1
 Angiopteris, 1
 Aspidium, 4 ... Wood fern
 Asplenium, 20 ... Spleenwort
 Athyrium, 1 ... Lady fern
 Blechnum, 4 ... Hard fern
 Ceropteris, 1
 Cheilanthus, 3
 Cyrtomium, 2

- Davallia, 5
 Doodia, 1
 Drynaria, 1
 Gleichenia, 1
 Goniopteris, 1
 Gymnogramma, 3 ... Golden fern
 Silver fern
 Hemionitis, 1
 Hemitalia, 1
 Hypolepis, 1
 Lastrea, 3
 Lindsæa, 1
 Lomaria, 1
 Lygodium 2 ... Climbing fern

Nephrodium, 17	Polypodium, 12
Nephrolepis, 8	Pteris, 15
Niphobolus, 1	Sagenia, 1
Onychium, 2	Scolopendrium, 1
Ophioglossum, 1	
Osmunda, 1 .. Royal fern	<i>Lycopodiaceæ.</i>
Pellæa, 2	Lycopodium, 2 ... Club-moss
Pleopeltis, 1	Selaginella, 13
Polybotrya, 1	

Of grasses indigenous to Mysore, the following is a descriptive list of those fit for stacking¹ :—

Garike.—A kind of *haridli*, grows to about 3 feet, a good nourishing grass, grows almost anywhere, but is best in light soil and with moderate moisture (*Cynodon dactylon*).

Ganjalu Garike.—A kind of *haridli*, very valuable for all purposes, and said to increase the milk-giving powers of cows; makes very good hay. Grows in light soil with moderate moisture (*Andropogon Bladhii*).

Hanchi.—A coarse common grass, grows in any sort of place, it runs much to stalk, and is not very nourishing because of the hardness of the stalk; there are two kinds, one coarser than the other (*Aristida cærulescens*).

Karddi.—(Spear grass.) Good when young, but dries up into sticks in the hot weather; very common all over the country (*Andropogon pertusus*).

Darbhe.—A rushy kind of grass, grows in swamps and jheels, has a feathery flower, and its seeds fly. It grows to about 4 feet in height. Cattle only eat it when young; it makes indifferent hay (*Eragrostis cynosuroides*).

Phāra or *Māni*.—A very valuable grass, good for every kind of cattle, grows anywhere, but best on black cotton soil; attains the height of about 1 foot, and throws up a long flowering stalk.

Uppāla.—A rushy kind of grass in jheels and swamps, height about 4 feet, nourishing and liked by cattle. Makes indifferent hay.

Sunti.—Grows in jheels, paddy fields and swamps, very good grass, makes good hay, reaches about 3 feet in height (*Panicum repens*).

Node.—A long rushy grass, grows only in damp jungles, acts as a purge on cattle, good for hide-bound beasts.

Solali.—Found in jheels, and grows to about 3 feet, makes indifferent hay. When young it is liked by, and good for, cattle, but its chief value is from the small grasses which are always found growing round the bottom of its stem.

Marahullu.—A good grass, grows to about 3 feet, is of a nourishing nature, requires a good deal of moisture.

The following are not good for stacking; they grow mixed together, *gondyada* or *chenlāgam*, *bhimiam*, *biduru-yele*, *yenuamatti*, *bili-hullu*, *timmattakam*, *naribāla*, *akki-hullu*, *hiré*.

There are also certain plants or herbs which are of great use to cattle; the best of these is called *purtanipuli*, which has seeds like burrs, with a thick-jointed sappy stem; grows along the ground, is very good for milch cattle.

¹ From a memorandum by Colonel Boddam. The botanical name has been added where it could be identified.

CROPS AND CULTIVATION¹

Cultivated lands are usually classed as dry, *kushki*; wet, *tari*; and garden, *tóta* or *búgáyat*. In the first are raised crops which do not require irrigation, *pair-áramba*: the wet crops are those dependent for their growth entirely on irrigation, *nir-áramba*: the products of garden cultivation are fruits or drugs requiring a moist situation with an abundant supply of water. Gardens are of four kinds: *tarkári tóta*, vegetable gardens; *tengina* or *adíke tóta*, cocoa-nut or areca-put plantations; *yele tóta*, betel leaf plantations; and *húvina tóta*, flower gardens. The agricultural seasons are twó, and the produce is called *Kártika fasal* or *Vais'ákha fasal* according to the time of ripening.² In the Mysore District the seasons are named *káru* and *hainu*. In parts of the Malnád the former has the name *kódu*.

But the farmer's calendar is regulated by the rains that fall under each of the *nakshatras* or lunar asterisms, after which they are called. The following are the names, with the generally corresponding months:—

<i>Nakshatra.</i>		<i>Lunar Month.</i>		<i>Solar Month.</i>	
As'vini	Chaitra		
Bharani	April	Mesha ... Aries
Krittika	Vais'ákha		
Rohini	May	Vrishabha . Taurus
Mrigas'ira	Jyeshtha		
Árdra	June	Mithuna ... Gemini
Punarvasu	Áshádha		
Pushya	July	Karkátaka Cancer
As'lesha					
Magha	S'ravana		
Pubba	August	Simha ... Leo
Uttara	Bhádrapada		
Hasta	September	Kanya ... Virgo
Chitta	As'víja		
Sváti	October	Tula ... Libra
Vis'ákha	Kártika		
Anurádha	November	Vris'chika Scorpio
Jyeshtha					
Múla	Márgas'ira		
Púrváshádha	December	Dhanus ... Sagittarius
Uttaráshádha	Pushya		
S'ravana	January	Makara ... Capricornus

¹ Buchanan's full and accurate accounts have been freely used in describing the modes of cultivation.

² *Kártika* falls in October—November; *Vais'ákha* in April—May.

<i>Nakshatra.</i>		<i>Lunar Month.</i>		<i>Solar Month.</i>	
Dhanishṭha...	...	Mágha			
S'atabhisha...	...	..	February...	Kumbha ...	Aquarius
Púrvabhádra	...	Phálguna			
Uttarabhádra	...	..	March ...	Mína ...	Pisces
Revati					

Bharani rain is considered to prognosticate good seasons throughout the year. This is expressed in the Telugu proverb *Bharani vaste dharani paṇḍudu*—if Bharani come, the earth will bring forth. The rains from Mrigas'ira to As'lesha are the sowing time, for food grains in the earlier part, and horse-gram in the later. Sváti and Vis'ákha rains mark the close of the rainy season. Anurádha to Múla is the reaping time, when only dew falls. At this season the future rains are supposed to be engendered in the womb of the clouds. Sugar-cane is planted in Púrvabhádra and Uttarabhádra.

The absolute dependence of all classes on the *pañchānga* or almanac is thus explained by Buchanan:—"Although, in common reckoning, the day begins at sunrise, yet this is by no means the case in the *chandramānam* almanac. Some days last only a few hours, and others continue for almost double the natural length; so that no one, without consulting the Panchāngadava or almanac-keeper, knows when he is to perform the ceremonies of religion. What increases the difficulty is, that some days are doubled, and some days altogether omitted, in order to bring some feasts, celebrated on certain days of the month, to happen at a proper time of the moon, and also in order to cut off six superfluous days, which twelve months of thirty days would give more than a year of twelve lunations. Every thirtieth month one intercalary moon is added, in order to remove the difference between the lunar and solar years. As the former is the only one in use, and is varying continually, none of the farmers, without consulting the Panchāngadava, knows the season for performing the operations of agriculture. These Panchāngadavas are poor ignorant Brahmans, who get almanacs from some one skilled in astronomy. This person marks the days, which correspond with the times in the solar year, that usually produce changes in the weather, and states them to be under the influence of such and such conjunctions of stars, male, female, and neuter; and everyone knows the tendency of these conjunctions to produce certain changes in the weather."

The following is a list of the most generally cultivated productions of the soil:—

Dry Crops.

Cereals.

Eleusine corocana, <i>Gartn.</i>	...	Rági	...	...	...	Rági.
Panicum frumentaceum, <i>Roxb.</i>	...	Little millet	...	...	...	Sáme, sáve.

<i>Panicum italicum</i> , <i>Linn.</i> ...	Italian millet ...	Navape.
„ <i>miliaceum</i> , <i>Linn.</i> ...	Common millet ...	Baragu.
„ <i>semiverticillatum</i> ...	... ..	Háraka.
<i>Pennisetum typhoideum</i> , <i>Rich.</i> ...	Spiked millet ...	Sajje.
<i>Sorghum vulgare</i> , <i>Pers.</i> ...	Great millet ...	Jola.

Pulses.

<i>Cajanus indicus</i> , <i>Spreng.</i> ...	Pigeon pea, doll ...	Togari, tovari.
<i>Cicer arietinum</i> , <i>Linn.</i> ...	Bengal gram, chick pea ...	Kadale.
<i>Dolichos biflorus</i> , <i>Linn.</i> ...	Horse gram, kulti ...	Huraļi.
„ <i>lablab</i> , <i>Linn.</i> ...	Cow gram ...	Avare.
<i>Lens esculenta</i> , <i>Mench.</i> ...	Lentil ...	Chanhangi.
<i>Phaseolus mungo</i> , <i>Linn.</i> ...	Green gram ...	Hesaru.
„ „ <i>var. radiatus</i> , <i>Linn.</i> ...	Black gram ...	Uddu.
<i>Vigna catianga</i> , <i>Enall.</i> ...	... ..	Alsandi, tađugani.

Oil seeds.

<i>Guizotia abyssinica</i> , <i>Cass.</i> ...	Foolish oil plant ...	Huchcheļļu, rámtil.
<i>Ricinus communis</i> , <i>Linn.</i> ...	Castor oil ...	Haraļu.
„ „ ...	Wild „ ...	Kád-, dođ-, or mara-haraļu.
<i>Sesamum indicum</i> , <i>D.C.</i> ...	Gingelli, sesame ...	Wolleļļu, achcheļļu.

Miscellaneous.

<i>Brassica nigra</i> , <i>Koch.</i> ...	Mustard ...	Sásive.
<i>Crotalaria juncea</i> , <i>Linn.</i> ...	Indian hemp ...	Sanabu.
<i>Gossypium herbaceum</i> , <i>Linn.</i> ...	Cotton ...	Araļe.
<i>Hibiscus cannabinus</i> , <i>Linn.</i> ...	Dekhan hemp ...	Punđi.
<i>Nicotiana tabacum</i> , <i>Linn.</i> ...	Tobacco ...	Hoge soppu.

Wet Crops.

<i>Oryza sativa</i> , <i>Linn.</i> ...	Rice ...	Bhatta, nellu.
<i>Saccharum officinarum</i> , <i>Linn.</i> ...	Sugar-cane ...	Kabbu.

Garden Crops.

<i>Allium cepa</i> , <i>Linn.</i> ...	Onion ...	Níruļļi.
„ <i>sativum</i> , <i>Linn.</i> ...	Garlic ...	Beļļuļļi.
<i>Arachis hypogæa</i> , <i>Linn.</i> ...	Ground-nut ...	Kaļļekáyi, nela kađale.
<i>Capsicum annuum</i> , <i>Linn.</i> ...	Chilly ...	Mensina káyi.
<i>Carum copticum</i> , <i>Benth.</i> ...	Bishop's weed ...	Oma.
<i>Carthamus tinctorius</i> , <i>Linn.</i> ...	Safflower ...	Kusumba.
<i>Coriandrum sativum</i> , <i>Linn.</i> ...	Coriander ...	Kottambari.
<i>Cuminum cyminum</i> , <i>Linn.</i> ...	Cummin seed ...	Jirige.
<i>Curcuma longa</i> , <i>Roxb.</i> ...	Turmeric ...	Arisina.
<i>Trigonella foenum græcum</i> , <i>Linn.</i> ...	Fenugreek ...	Mentya.
<i>Zingiber officinale</i> , <i>Rosc.</i> ...	Ginger ...	Sunti.

Miscellaneous.

<i>Areca catechu</i> , <i>Linn.</i> ...	Areca-nut ...	Adike.
<i>Cocos nucifera</i> , <i>Linn.</i> ...	Cocoa-nut ...	Tengina káyi.
<i>Coffea arabica</i> , <i>Linn.</i> ...	Coffee ...	Búndu, kápi.
<i>Elettaria cardamomum</i> , <i>Maton.</i> ...	Cardamom ...	Yélakki.
<i>Morus indica</i> , <i>Linn.</i> ...	Mulberry ...	Uppu nerle, kambaļi gida.
<i>Musa sapientum</i> , <i>Linn.</i> ...	Plantain ...	Bále.

Piper betle, <i>Linn.</i>	Betel vine	Viled-ele.
„ <i>nigrum</i> , <i>Linn.</i>	Black pepper	Meṇasu.
<i>Triticum sativum</i> , <i>Lamk.</i>	Wheat	Gódhī.

The total area taken up for cultivation in 1891-2 is stated at 5,685,160 acres, of which 4,601,729, or 80·9 per cent., were for dry cultivation; 697,419, or 12·2 per cent., for wet cultivation; 234,955, or 4·1 per cent., for garden cultivation; and 148,834, or 2·6 per cent., for coffee. The approximate area actually under crops from 1870, so far as figures are available from the Annual Reports, may be gathered from the following statement, expressed in millions of acres:—

1870 ... 5·15	1876 ... 5·53	1882 ... 4·51	1887 ... 5·24
1871 ... 4·91	1877 ... 4·38	1883 ... 4·65	1888 ... 5·28
1872 ... 5·26	1878 ... 4·39	1884 ... 4·47	1889 ... 5·53
1873 ... 5·20	1879 ... 3·99	1885 ... 4·88	1890 ... 5·60
1874 ... 5·22	1880 ... 4·28	1886 ... 5·10	1891 ... 5·68
1875 ... 5·02	1881 ... 4·35		

In 1865 the acreage seems to have been 3·14 millions, so that cultivation has increased 80 per cent. in twenty-seven years since. But part of the increase may, no doubt, be attributed to more accurate measurement, resulting from the progress of the Revenue Survey. In the first series the highest point was reached apparently in 1876, just before the great famine; but the crops of that year perished, and it was thirteen years before cultivation spread to the same extent again. Adopting intervals of five years, the percentage of approximate acres returned as under various crops was as follows:—

CROPS.		1871.	1876.	1881.	1886.	1891.
Dry ...	Rági	66·04	84·	75·11	73·4	45·9
	Other Food Grains ... ..						28·6
	Oil Seeds	2·1	2·2	3·06	4·5	4·1
	Cotton	·78	·09	—	·87	·71
	Tobacco	·4	·21	—	·92	·2
Wheat	·25	·1	·4	·36	·06	
Wet ...	Rice	24·5	8·	12·73	13·3	12·7
	Sugar-cane	·45	·2	—	·72	·62
	Mulberry	·28	·2	—	·2	·24
Garden	Cocoa-nut and Areca-nut	—	2·3	3·1	2·7	2·8
	Vegetables	1·9					·5	—	·66	1·1
	Coffee	2·3	2·1	3·2	2·1	2·6

The most important fluctuation exhibited by these figures is an apparent relinquishment of rice cultivation in favour of the cultivation of rági and associated food grains, and of oil seeds. This movement, which took place in the years 1871 to 1873, is not specially noticed in the Reports. But it appears to have been coincident with a change of policy whereby the control of irrigation channels and tanks was transferred from the Revenue officers to the Public Works Department, with the view of their being systematically repaired, the necessity for which had long been recognized, and brought up to a good standard of safety. The former frequent waste of water was now checked, and steps were taken to enforce the responsibilities of the cultivators in regard to the maintenance of the restored irrigation tanks. Moreover, as the new Revenue Survey approached the rice districts, it was now realized that all occupied lands were liable to pay the assessment, whether cultivated or not. Hence perhaps a reduction in the area of wet cultivation which the statistics disclose, the actual area under rice having dropped from 1·32 million acres before 1871 to little over half a million in the subsequent year. Another explanation may be found in the following statement from the Report for 1871-2:—"The fall in the value of produce has been attended by considerable relinquishments of land, chiefly on the part of speculators, who appear to have taken up land wherever it could be obtained during the period of high prices, and who, doubtless, in many instances have found it no longer worth retaining."

The following figures, taken from the returns for 1891-2, are instructive as showing the Districts in which the cultivation of particular products is most extensive. Mysore and Bangalore grow the most rági, followed by Týmkkúr, Hassan, and Kolar, in this order. Chitaldroog and Mysore have the largest area under other dry grains and oil seeds. Chitaldroog is pre-eminently the cotton district, and also takes the principal lead in the limited area under wheat. Mysore produces the most tobacco. Shimoga is the chief rice district, the cultivation being to a great extent dependent on the rains alone: Mysore follows, with its splendid system of irrigation channels: Kadur and Hassan come next, partaking of the character of both. Shimoga, Kolar, and Hassan are the principal sugar-cane districts. Mulberry cultivation, for the nourishment of silkworms, is confined entirely to Mysore and the eastern districts. Týmkkúr stands first in cocoa-nut and areca-nut gardens, especially the former, followed by Hassan, Mysore and Shimoga, which last excels in areca-nut. Kolar cultivates the largest extent of vegetables, while Bangalore and Týmkkúr come next, a good way after. Kadur and Hassan are almost exclusively the coffee districts.

DISTRICT.	NUMBER OF ACRES CULTIVATED WITH—											
	Rági.	Other Food Grains.	Oil Seeds.	Cotton.	Tobacco.	Wheat.	Rice.	Sugarcane.	Mulberry.	Cocoa-nut and Areca-nut.	Vegetables.	Coffee.
Bangalore ...	449,986	23,440	10,944	—	1,235	2	42,062	2,169	3,616	8,183	11,514	—
Kolar ...	256,009	66,947	11,508	—	826	69	40,476	7,492	1,751	1,709	27,032	15
Túmkúr ...	308,427	175,187	28,308	4,188	1,541	43	28,805	961	1,316	38,725	7,048	—
Mysore ...	538,178	359,914	60,385	1,216	5,179	32	107,860	4,809	5,564	22,666	2,615	—
Hassan ...	294,494	76,747	33,797	166	1,551	67	93,215	7,043	—	24,791	2,905	51,935
Shimoga ...	161,504	155,937	10,999	1,633	489	525	199,705	7,920	—	21,375	2,398	707
Kadur ...	115,364	89,551	11,701	976	530	692	96,339	765	—	18,582	267	77,383
Chitaldroog	176,461	485,756	39,702	27,755	1,060	1,589	26,656	774	—	5,850	3,960	—
Total ...	2,300,425	1,433,479	207,344	35,934	12,411	3,019	635,118	31,933	12,247	141,881	57,739	130,040

Rági—(the *marwa* or *mandwa* of northern India) is by far the most important of any crop raised on dry fields and supplies all the lower ranks with their common diet. It is reckoned the most wholesome and invigorating food for labouring people.¹ Three kinds are distinguished of it, which, however, are only varieties; the *kari* or black, *kempu* or red, and *hullupare*. All are equally productive, but the third when nearly ripe is very apt to shake the seed. In some places all three are sown intermixed in the same field, but in others more attention is paid to the quality of the grain. The black is considered in some parts to be simply grain that has got wet when it is threshing.

The principal varieties in the eastern districts are the *giḍḍa rági* and *doḍḍa rági*. The former ripens in four months, and the latter in four and a half; and the latter is esteemed both the best in quality, and the most productive; but when the rain sets in late, as it requires less time to ripen, the *giḍḍa* is preferable. In the Mysore District the *giḍḍa rági* is called *kár rági*, and somewhat different. There are three kinds of *kár rági*: the *balaga*, or straight-spiked *rági*, which is always sown separately from the others; the *bili modgala*, or white *rági* with incurved spikes; and the *kari modgala*, or incurved black *rági*: the two latter are sometimes kept separate, and sometimes sown intermixed. The cultivation for all the three is quite the same and the value of the different kinds is equal; but the produce of the *kari modgala* is rather the greatest.

“The whole world,” says Wilks, “does not, perhaps, exhibit a cleaner system of husbandry than that of the cultivation of *rági* in the home fields of Mysore. On the first shower of rain after harvest the home fields are again turned up with the plough,² and this operation, as showers occur, is repeated six successive times during the dry season, at once destroying the weeds and opening the ground to the influence

¹ The following is the composition of *rági* grain according to Professor Church in *Food Grains of India* :—

	In 100 parts		In 1 lb. oz grains
	Husked	Whole	
Water	13·2	12·5	2 0 413
Albuminoids	7·3	5·9	0 ,, 413
Starch	73·2	74·6	11 ,, 409
Oil	1·5	0·8	0 ,, 56
Fibre	2·5	3·6	0 ,, 252
Ash	2·3	2·6	0 ,, 182

The nutrient ratio is here 1 : 13, the nutrient value 84. The percentage of phosphoric acid in the whole grain is about 0·4.

² This is the practice in the Mysore District, but in the eastern districts the fields are left untouched after harvest, with the stubble standing, until the early rains of the following spring.

of the sun, the decomposition of water and air, and the formation of new compounds. The manure of the village, which is carefully and skilfully prepared, is then spread out on the land, and incorporated with it by a seventh ploughing, and a harrowing with an instrument nearly resembling a large rake, drawn by oxen and guided by a boy: when the field is completely pulverized, a drill plough, of admirable and simple contrivance, performs the operation of sowing twelve rows at once by means of twelve hollow bamboos at the lower end, piercing a transverse beam at equal intervals and united at the top in a wooden bowl, which receives the seed and feeds the twelve drills: a pole at right angles with this beam (introduced between two oxen) is connected with the yoke; the bamboos project below about three inches beyond the transverse beam, being jointed at their insertion for the purpose of giving a true direction to the projecting parts, which being cut diagonally at the end, serve, when the machine is put in motion, at once to make the little furrow and introduce the seed: a flat board, placed edgewise and annexed to the machine, closes the process; levelling the furrows and covering the seed. If the crop threatens to be too early or too luxuriant, it is fed down with sheep. Two operations of a weeding plough of very simple construction, at proper intervals of time, loosens the earth about the roots and destroys the weeds; and afterwards during the growth of the crop, at least three hand weedings are applied. This laborious process rewards the husbandman in good seasons with a crop of eighty fold from the best land. The period between seed-time and harvest is five months. There is another kind of *rági* which requires but three months. It is sown at a different season in worse ground, and requires different treatment."

In some parts, as near Seringapatam, the ground having been prepared in the same way, the *rági* is sown broad-cast, and covered by the plough. The field is then smoothed with the *halive*, which is a harrow or rather a large rake drawn by two bullocks. Then, if sheep are to be had, a flock of them is repeatedly driven over the field, which is supposed to enable it to retain the moisture; and for this purpose bullocks are used when sheep cannot be procured. Next day single furrows are drawn throughout the field at the relative distance of six feet. In these are dropped the seeds of either *avare* or *tovari*, which are never cultivated by themselves; nor is *rági* ever cultivated without being mixed with drills of these leguminous plants. The seed of the *avare* or *tovari* is covered by the foot of the person who drops it into the furrow. Fifteen days afterwards the *kunte* or bullock-hoe is drawn all over the field; which destroys every young plant that it touches, and brings the remainder into regular rows. On the thirty-fifth day the

kunte is drawn again, at right angles to its former direction. On the forty-fifth day it is sometimes drawn again ; but when the two former ones have sufficiently thinned the young corn, the third hoeing is not necessary. At the end of the second month, the weeds should be removed by the small iron instrument called *ujari*. According to the quantity of rain, the *rági* ripens in from three to four months. The *avare* and *tovari* do not ripen till the seventh month. The reason of sowing these plants along with the *rági* seems to be that the rains frequently fail, and then the *rági* dies altogether, or at least the crop is very scanty ; but in that case the leguminous plants resist the drought and are ripened by the dews, which are strong in autumn. When the *rági* succeeds, the leguminous plants are oppressed by it and produce only a small return ; but when the *rági* fails, they spread wonderfully and give a very considerable return.

In other places, as in Kolar, where the seed is sown by the drill-plough, *kúrige* ; behind the *kúrige* is tied the implement called *sudike*, into which is put the seed of the *avare* or *tovari* ; by this method, for every twelve drills of *rági* there is one-drill of pulse. After the field has been sown, it is harrowed with the bullock-rake called *halive*, and then smoothed with a bunch of thorns, which is drawn by a bullock and pressed down by a large stone. Here sheep are only used to trample the *rági* fields when there is a scarcity of rain. The bullock-hoe called *kunte* is used on the fifteenth and eighteenth days after sowing. On the twenty-sixth day the harrowing is repeated. On the thirty-second the field is cleared from weeds with the implement called *oravari*. In four months the *rági* ripens and in five the pulses.

In the west, about Periyapatna, in very rich soils, nothing is put in drills along with *rági* ; but immediately after that grain has been cut, a second crop of *kađale* is sown, which does not injure the ground. Sometimes a second crop of *sáme* or of *huchchellu* is taken ; but these exhaust the soil much. When rain does not come at the proper season, the *rági* fields are sown with *hurali*, *kađale*, *huchchellu*, or *kari-sáme*. The two leguminous plants do not injure the soil ; but the *huchchellu* and *sáme* render the succeeding crop of *rági* very poor.

In Shimoga the *rági* seed, mixed with dung, is placed very thin with the hand in furrows drawn at the distance of about seven inches throughout the field, a small quantity being dropped at about every ten inches. In every seventh furrow are put the seeds of *avare*, *tovari*, and *pundi* intermixed, or of *uddu* by itself.

Rági is reaped by the sickle, and the straw is cut within four inches of the ground. For three days the handfuls are left on the field ; and then, without being bound up in sheaves, are stacked, and the whole is

well thatched. At any convenient time within three months it is opened, dried two days in the sun, and then trodden out by oxen. The seed, having been thoroughly dried in the sun, is preserved in straw *múde*. The remainder is put into pits, or *hagevu*; where, if care has been taken to dig the pit in dry soil, it will keep in perfect preservation for ten years.

Rági is always ground into flour, as wanted, by means of a hand-mill called *bisa-gallu*. In this operation it loses nothing by measure. The flour is dressed in various ways. The most common are, a kind of pudding called *hitfu*, and two kinds of cakes called *roffi* and *dóshe*, both of which are fried in oil. For all kinds of cattle, the rági straw is reckoned superior to that of rice.¹

¹ The following is an estimate by Dr. Forbes Watson of the food-value of rági and other Indian grains, taken from Mr. Elliot's book (*Experiences of a Planter*).

"The position of rági as food, when compared with some of the other Indian cereals, appears from the following table:—

Name of the Grain	Wheat	Bajree (<i>Penicillaria spicata</i>)	Jowaree (<i>Sorghum vulgare</i>)	Rice (<i>Oryza sativa</i>)	Rági (<i>Eleusine corocana</i>)
Number of analyzed samples	9	3	2	9	7
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Moisture	12'00	12'00	12'00	12'00	12'00
<i>Nitrogenous matter</i>					
Gluten, albumen, &c. ...	13'42	10'27	9'38	7'40	6'53
Cellulose or woody fibre	2'69	1'49	2'23	'39	3'36
<i>Carbonous matter</i>					
Starch, gum, &c. ...	68'81	71'01	72'68	78'97	74'44
Fat or oil	1'15	3'27	2'04	'57	1'17
Oxide of iron	'019	'026	'018	'008	'064
Potassa	'214	'405	'207	'066	'534
Soda	'392	'132	'135	'082	'019
Lime	'068	'064	'094	'026	'617
Magnesia	'241	'239	'260	'103	'163
Chlorine	'059	'058	'016	'016	'048
Phosphoric acid ...	'817	'678	'856	'287	'595
Sulphuric acid ...	'154	'105	'108	'080	'110
Silica	'029	'375	'088	'092	'334

The order according to which these cereals are arranged is determined by the amount of nitrogenous matter they contain. Wheat stands pre-eminent, followed by bajree and jowaree [or saje and jola], whilst rice and rági occupy the lowest position. It will be observed that, in order to avoid the perturbations in the natural order which may arise from a varying amount of moisture in the grains, all the analyses have been reduced to a common moisture of twelve per cent., which is that to which all grains more or less approach. The numbers inserted in the table are, therefore, true comparative numbers.

The rágis grown at different places seem to show almost a greater latitude in composition than most of the other grains. Among the seven samples analyzed the amount of nitrogenous matter varies between 5'49 and 9'24 per cent., so that, although

Tóta or *náti rági* is not the same with that cultivated on dry grounds, although in the sense adopted by botanists it is not specifically different ; but the seed which is raised on dry fields will not thrive in gardens ; nor will that which is raised in gardens thrive without irrigation. Garden rági is always transplanted, and hence it is called *náti*. The following is the process followed in the Kolar District. For the seedling bed, dig the ground in Pushya (Dec.—Jan.) and give it a little dung. Divide it into squares, and let it have some more manure. Then sow the seed very thick ; cover it with dung, and give it water, which must be repeated once in three days. The ground into which it is to be transplanted, is in Pushya ploughed five times, and must be dunged and divided into squares with proper channels. About the beginning of Mágha, or end of January, water the seedlings well, and pull them úp by the roots : tie them in bundles, and put them in water. Then reduce to mud the ground into which they are to be transplanted, and place the young rági in it, with four inches distance between each plant. Next day water, and every third day for a month this must be repeated. Then weed with a small

the average is inferior to the rice, there are samples which may be richer in nitrogen than most of the rices. Still, this is only one aspect of the question. The amount of nitrogen is too often looked upon as the only exponent of the nutritive value. This is a very circumscribed view of the extremely complicated and many-sided problem of nutrition. Each of the normal components of the human body can become of paramount importance under certain conditions. The oxide of iron in the ash of the grains amounts only to some tenths of a per cent. ; but still the regular supply even of this small quantity is essential for the proper performance of the vital functions, as it is indispensable in the formation of the blood-corpuscles. A dearth of iron would, therefore, be just as fatal as a want of the nitrogenous, or carbonous, or other principal constituent of food. In judging, therefore, of the relative value of an article of food, the amounts of nitrogen and carbon cannot be relied on as the sole guide. The mineral constituents must be taken into account. At the time when I published my first analyses of rági, these extended only to the organic compounds of the grain, and the position which I then assigned to it—guided only by the percentage of nitrogen—has been borne out by the subsequent analyses. Since then, however, a detailed examination of the ash has been made, which yielded some remarkable conclusions. The rági seems to be uncommonly rich in certain important mineral constituents. The amount of phosphoric acid in rági is only lower by one-fourth than that in wheat, and it is more than twice as high as in rice. It contains eight times as much iron, and eight times as much potassa as rice, and, indeed, more of potassa than any of the other grains. It is, likewise, exceptionally rich in lime. The ash, composed, as it chiefly is, of the most important elements, amounts on the average to 2½ per cent. in rági, as compared with 0·760 per cent. contained in rice. It is therefore possible, if not indeed probable, that the large amount and favourable composition of the rági ash may more than counterbalance its inferiority in nitrogen, so that although, according to the nutritive standard hitherto in use, it must be put below rice, rági may still be, on the whole, a food satisfying by itself more completely the numerous exigencies of an article of human diet than rice."

hoe, and water once in four days. It ripens in three months from the time when the seed was sown; and in a middling crop produces twenty fold. It is only sown on the ground at times when no other crop could be procured, as the expense of cultivation nearly equals the value of the crop. Another kind of *nát rági* cultivated in Sira as a *Vais'ákha* crop is called *tripati*.

Avare—is never cultivated alone, but always with *rági*, as described above. When ripe, the legumes are nearly dry. The plant having been cut and for one day exposed to the sun, is beaten with a stick to separate the seed. That which is designed for seed is preserved in *múdes*; while that for consumption is kept in pots, and is used in curries. The straw is eaten by all kinds of cattle except horses.¹

Togari (or **Tovari**)—is also cultivated only with *rági*, as described above. It is cut when almost dry, then put up in heaps, and on the day after it is opened to dry in the sun. The grain is beaten out with a stick; and that intended for sowing must be preserved in a straw *múde*. It is used in curry. After the seed has been threshed, cattle eat the husks of the legume. The straw is used for fuel. A larger variety, called *turuka togari*, is produced by garden cultivation.²

The best soil for the cultivation of these three articles is the black soil, or *ere bhúmi*; which yields a crop of *rági* every year, and even without manure will give a considerable return; but when it can be procured, dung is always given. After a crop of *jóla*, *rági* does not thrive; but *jóla* succeeds after a crop of *rági*. The next best soil for *rági*, and the one most commonly used, is the *kebbe* or red soil. In this also it is sometimes cultivated without dung; but it requires to be manured at least once in two or three years. In *maralu*, or sandy, and *dare* soils, it every year requires dung.

Jola—next to *rági* is the most considerable dry crop. In the south it is often sown for fodder; for, when the crop is not uncommonly good,

¹ The following is Professor Church's analysis of *avare* beans :—

	In 100 parts		In 1 lb
	Husked	With husk		oz grs
Water	12·1	12·1	1 410
Albuminoids	24·4	22·4	3 255
Starch	57·8	54·2	8 294
Oil	1·5	1·4	0 98
Fibre	1·2	6·5	1 17
Ash	3·0	3·4	0 238

The nutrient ratio deduced is 1 : 2·5; the nutrient value 80.

² According to the same authority 1 lb of the pea would contain 1 oz 361 grains of water, 3 oz 208 grains of albuminoids, and 9 oz 11 grains of starch. The nutrient ratio would be about 1 : 3; the nutrient value 80.

the grain is no object. It is cut and given to the cattle at a time when rági straw is not to be procured. Previously to being given to cattle, however, it must be dried, as the green straw is found to be very pernicious. There are two kinds of *jóla*; the white (*bili*) and red (*kempu*). When they are intended to be cut for the grain, these are sown separately; as the red kind ripens in three months, while four are required to ripen the white *jóla*. A red rági soil is preferred for it, and crops of rági and *jóla* are generally taken alternately, the crop of rági having an extraordinary allowance of dung. The *jóla* requires less rain than the rági, and admits of a second crop of *huráli* being taken after it; and thus, in the course of two years, there are on the same ground three crops.

The *jóla* is both made into flour for puddings and cakes, and is boiled whole to eat with curry, like rice. It is a good grain; but at the utmost does not keep above two years.

The *jóla* that is cultivated on dry field in Madgiri is of three kinds: *agara*, *kempu*, and *hasaru*. They are all, probably, mere varieties. The best soil for them is a black clay; and the next, the same mixed with sand. For rági these soils are of a poor quality; but on the same dry field *jóla* and rági may be alternately cultivated without injuring either. In Vais'ákha, or the second month after the vernal equinox, plough four times. After the next rain sow the seed. It is sown either broad-cast or by dropping it in the furrow after the plough. Smooth the field by drawing a plank over it. It requires neither weeding nor manure. For fodder its straw is inferior to that of rági, but superior to that of rice. *Agara jóla* ripens in $4\frac{1}{2}$ months, *kempu* and *hasaru* in four months. Their produce is rather less in the order they are mentioned.

Towards Harihar the *jóla* crop is always accompanied by one or more of the following articles: *avare*, *togari*, *hasaru*, *madiki*, *huráli*, and *alasandi*. These being intended chiefly for family use, a portion of each is wanted, and every man puts in his *jóla* field a drill or two of each kind. *Jóla* thrives on black clay, but is also sown on the red earth, and even sometimes on the stony soil. In Chaitra the field is hoed with a *heg-kunte*, which requires from six to eight oxen to draw it; for this is the month following the vernal equinox, when the soil is very dry and hard. In the following month the field is ploughed once, and then manured. In the month preceding the summer solstice, the seed is sown after a rain by means of the drill; while the rows of the accompanying grains are put in by means of the *sudike*, which is tied to the drill. The field is then smoothed with the *bólu kunte*, a hoe drawn by oxen, of lighter make than the *heg-kunte*. On the twentieth

day the field is weeded with the *ede kunte*, and on the twenty-eighth day this is repeated. In five months the *jóla* ripens, without further trouble.¹

In the north of the Túngkúr District a few fields of watered land are entirely allotted for the cultivation of *bili jóla*. The soil of these is a rich black mould, but does not require much water. Only one crop a year is taken. The produce is great, not only as an immense increase on the seed sown, but as affording a great deal of food. The following is the mode of cultivation:—Begin to plough in Vais'ákha and in the course of seven months plough eight or nine times. Then manure with dung, mud from the bottom of tanks, and leaves of the *honge*; and if there be no rain, water the field before sowing. Previous to being planted, the seed must have been soaked in water. A man then draws furrows with a plough, and another places the seed in the furrows at the distance of four or five inches. By the next furrow it is covered. The field is then smoothed by drawing over it a plank, on one end of which a man stands, and by this means that forms a low ridge. Thus throughout the field, at the distance of six feet, which is the length of the plank, parallel rows of ridges are produced. The intermediate spaces are divided into oblong plots by forming with the hand ridges which at every eight or twelve cubits distance cross the others at right angles. At the same time the areas of the plots are exactly levelled. The waterings, after the first month, must be given once in twelve or fourteen days. In some villages the farmers weed the *jóla* when it is six weeks old; in others they do not take this trouble. Some people around every field of *jóla* plant a row of *kusumba* seeds, and the prickly nature of that plant keeps away cattle.

Bili jóla is sometimes sown in place of the Vais'ákha crop of rice. This must be followed by a Karttika crop of *rági*, as after it the produce of rice would be very small. The *jóla* also thrives best after a Karttika crop of *rági*. *Agara jóla* is also sometimes seen in place of the Vais'ákha crop on rice ground. It ripens in four months.

Sare.—There are three kinds of *sáve* cultivated in the east: *hari*,

¹ The nutrient ratio of *jóla* is given by Professor Church as 1 : 8½, and the nutrient value as 86. It contains, he tells us, '86 per cent. of phosphoric acid and '21 per cent. of potash. The following is his analysis of the grain:—

	In 100 parts		In 1 lb	
Water	...	12'5	...	2 oz 0 gr
Albuminoids	...	9'3	...	1 ,, 214 ,,
Starch	...	72'3	...	11 ,, 248 ,,
Oil	...	2'0	...	0 ,, 140 ,,
Fibre	...	2'2	...	0 ,, 154 ,,
Ash	...	1'7	...	0 ,, 119 ,,

kari, and *hál* or *bili*. They are never intermixed, and the cultivation of the first kind differs from that of the other two. For *hari sáve* plough three times in the same manner as for *rági*. If there be any to spare, give the field dung, sow broad-cast, and harrow with the bullock-rake. In three months the grain ripens without farther trouble ; when it is cut down, stacked on the field for six days, and then trodden out. It keeps best in the store-house, and is never made into flour. Cattle eat the straw without injury, but it is inferior to the straw of either *rági* or rice. For the other two kinds, plough three times in the course of Ashádha (June—July) ; then, after the first good rain, sow broad-cast, plough in the seed, and harrow. They do not necessarily require dung ; but if any can be spared, they will grow the better for it. When ripe, which happens also in three months, they are managed as the other kind is. The seed and produce of all are nearly the same.

In Madgiri the best soil for *sáme* is considered to be the red or ash-coloured, containing a good deal of sand, which is common on high places. Without much manure, this ground does not bear constant cropping. After resting a year or more, it is first cultivated for *hurali* and next season for *sáme*. If manure can be procured, a crop of *rági* is taken, and then it has another fallow. Dung being a scarce article, in place of the *rági* a second crop of *sáme* is taken ; but it is a bad one. If the fallow has been long, and high bushes have grown up, after burning these, the crop of *hurali* will be great, and two or three good crops of *sáme* will follow. When good *rági* soil has for a year or more been waste, and is to be brought again into cultivation, the first crop ought to be *sáme* ; for *rági* thrives very ill on land that is not constantly cultivated. In this case, the *sáme* gives a great quantity of straw, but little grain. When the rains have failed, so that the *rági* has not been sown, or when, in consequence of drought, it has died, should the end of the season be favourable, a crop of *sáme* is taken from the fields that are usually cultivated with *rági*. This crop also runs to straw, and the following crop of *rági* requires more dung than usual. In the course of thirty days, any time between the middle of April and middle of July, plough three or four times. Then after a good rain, or one which makes the water run on the surface of the ground, harrow with the rake drawn by oxen, and sow the *sáme* seed with the drill, putting in with the *sudike* rows of the pulses called *hurali* or *togari*. In four months, without farther trouble, it ripens.

The *sáme* in Sira is of three kinds : *bili*, *kari*, and *maliga* or *mujika*. The cultivation for the three kinds is the same, but the seeds are always kept separate. The soil that agrees with them is the *maralu*, and *dare*, or poor sandy and stony lands. This soil, if it were dunged, would

every year produce a crop of *sáme* ; but, as that can seldom be spared, the *sáme* is always succeeded by a crop of *hurali*, which restores the ground ; and alternate crops of these grains may be continued, without any fallow, or without injury to the soil. *Bili sáme* ripens in $3\frac{1}{2}$ and *kari* in four months ; the *maliga* requires only three months, and is therefore preferred when the rains begin late ; but it gives little straw, and therefore in favourable seasons the others are more eligible. *Sáme* straw is here reckoned better fodder than that of rice ; and, when mixed with the husks of *hurali* or *togari*, is preferred even to that of *rági*. Except in case of necessity, *jóla* straw is never used.

Sáve in the south is never sown on the *ere* or black clay, and rarely on the *kebbe*, or red soil ; the two worst qualities of land being considered as sufficiently good for such a crop. In the spring the field is ploughed five times. At the commencement of the heavy rains it is sown broad-cast, and the seed is covered by a ploughing. Even in the worst soil, there is no absolute necessity for dung ; but when any can be spared, the crop will doubtless be benefited by manure. It ripens without further care in three months, is cut close to the ground, and gathered into stacks. Five or six days afterwards it is spread on a threshing-floor, and the grain is trampled out by oxen. That intended for sowing is dried in the sun, and tied up in straw *múdes*. The remainder is preserved in *kanajas*. It is sometimes boiled whole, like rice ; at others, ground into flour for cakes. All kinds of cattle eat the straw, which is also esteemed the best for stuffing pack-saddles.¹

Navane.—There are two varieties cultivated in the Mysore District ; the one called *gidáda*, or short ; and the other *jótu*, or long ; and *dodda*, or great. Unless a quantity of dung can be spared, it is never sown on the two worst soils. On the two best soils it requires no manure, and does not injure the succeeding crop of *rági*. In the spring, plough six times. When the heavy rains commence, sow, and plough in the seed. It requires neither weeding nor hoeing, and ripens in three months. Cut it close to the ground, and stack it for eight days ; then spread it to the sun for a day, and on the next tread out the grain with oxen. The seed for sowing must be well dried in the sun, and preserved in a *múde*. The remainder is kept in a *kanaja*. It is made into flour for *hiṭṭu* or pudding, and is also frequently boiled whole, like rice. The straw is used for fodder, but is not good. The *jótu navane* is sometimes put in drills with *rági*, in place of the *avare* or *togari*.

Toward Madgiri the *navane* is of three kinds, *bili*, which is cultivated

¹ The following analysis of the grain (with husk) is given by Professor Church :— In 100 parts there are contained, water 12·0 ; albuminoids, 8·4 ; starch, 72·5 ; oil, 3·0 ; fibre, 2·2 ; ash 1·9. The nutrient ratio is 1 : 9·5, and the nutrient value 88.

on watered land; *kempu*, which is cultivated in palm gardens; and *mobu*, which is cultivated in dry field. It is sometimes sown along with cotton, but it is also cultivated separately. It grows on both *rági* and *jóla* ground, and does not injure the succeeding crop of either. In the course of twenty or thirty days, any time in Jyésztha, Ashádha, or Srávana, the third, fourth, and fifth months after the vernal equinox, plough four times. If dung can be obtained, it ought to be put on after the first ploughing. With the next rain, harrow with the rake drawn by oxen, sow broad-cast, and harrow again. The straw is reckoned next in quality to that of *rági*; but the grain, in the opinion of the natives, is inferior.

The navane cultivated on dry field in Sira is that called *biži*, and is raised either on the two poorer soils; or on a black mould that has been prepared for it by a crop of the pulse called *hesaru*. It is considered as exhausting to the ground; but this is obviated by ploughing up the field immediately after the navane has been cut, thus exposing the soil to the air. In the two months following the vernal equinox, plough four times. With the next good rain, harrow with the rake drawn by oxen, and sow the seed with the drill; putting navane in the *kurige*, and the pulse called *avare* in the *sudike*. In three months it ripens without farther trouble. For cattle, the straw is better than that of rice.

Baragu—is of two kinds; white and black. A sandy soil of any kind agrees with this corn, which is also valuable as requiring very little rain. The straw is better fodder than that of rice. In the second month after the vernal equinox, plough three times. After the next rain, in the following month, either sow with the drill, and harrow with the rake drawn by oxen, or sow broad-cast, and plough in the seed. In three months it ripens without farther trouble, and in a favourable season produces sixteen seeds.

There is only one kind cultivated in Kolar. After the heavy rains have ceased, plough twice, and without manure sow broad-cast, and plough in the seed. Without any farther trouble it ripens in two months and a half, is cut down close by the ground, stacked for one or two days, and then trodden out. The grain is kept in store-houses, and preserves well for two years. It is boiled entire, like rice. The straw is only used for fuel. A good crop produces twelve seeds, a middling one, eight. It requires a rich black clay.¹

Haraka—as it is found to injure the succeeding crop of *rági*, is never in the south cultivated on the best soil, and rarely on that of the

¹ The following is given by Professor Church as the chemical composition of the grain:—In 100 parts there are, water, 12.0; albuminoids, 12.6; starch, 69.4; oil, 3.6; fibre, 1.0; ash 1.4. The nutrient ratio is 1 : 6, and the nutrient value 89.

second quality. It is commonly followed by a crop of horse gram, and is seldom allowed any manure. In the spring plough five times. The dung, if any be given, must be put on before the last ploughing. When the heavy rains commence, sow broad-cast, and plough in the seed: next day form drills of togari in the same manner as with rági. When the sprouts are a span high, hoe with the *kunte*, once longitudinally and once across the field. Next weed with the *ujare*. It ripens in six months; and having been cut down near the root, is stacked for six days. It is then trodden out by cattle. The seed reserved for sowing must be well dried in the sun. The remainder is preserved in the *kanaja*, but does not keep long. It is both boiled like rice, and made into flour for dressing as hiṭṭu, or pudding. The straw is eaten by every kind of cattle; but, of all the fodders used here, this is reckoned the worst.

The following is the process of cultivation in the east. At the commencement of the rains, plough three times in the course of a few days. As soon as the heavy rains begin, sow the seed broad-cast, and cover it by a third ploughing. It requires no manure, and here the pulse called togari is never sown with hárika. At the end of a month weed it with the implement called *woravári*. It requires six months to ripen, and is cut near the root, stacked on the field for five or six days, and then dried in the sun, and trodden out. The grain is commonly preserved in pits, and does not keep longer than one year. It is never made into flour. The straw is bad forage, and is used chiefly for manure. The produce in a good crop is twenty-fold; in a middling crop fifteen-fold.

Hárika at Madgiri is sown in low soft places, where, in the rainy season, water is found near the surface. The soil is of different kinds. In Vais'ákha, Jyésztha and Ashádha, or three months following the middle of April, plough three times in the course of thirty days. After the next rain that happens, harrow with the rake drawn by oxen, sow broad-cast, and then repeat the harrowing. It ripens in six months without farther trouble. As fodder for cattle, the straw is reckoned equal to that of rági, or of hurali. The produce in a good crop is forty-fold.

Alsandi.—Of this grain there is but one kind, and it is cultivated in the south only as a *kár* crop, which is performed exactly in the same manner with that of the *kár uddu*. The green pods, and ripe grain, are both made into curries, by frying them in oil with tamarinds, turmeric, onions, capsicum, and salt. Horses eat the grain; but the straw is only useful as manure.¹

¹ According to Professor Church 100 parts of the husked bean contain—water, 12·5 parts; albuminoids, 24·1; starch, 56·8; oil, 1·3; fibre, 1·8; and ash, 3·5, of which 1·0 consists of phosphoric acid.

Hurali or *horse-gram* is of two kinds, black and white or red ; both are sown intermixed. The worst qualities of soil are those commonly used for this grain in the east ; and on the same fields, *sáme*, *hárika* and *huchchellu* are cultivated, without one crop injuring the other, or without a rotation being considered as of the smallest benefit. For horse-gram plough twice, in the course of a few days, any time in *Kártika*. Then after a shower sow broad-cast ; or, if none happen, steep the seed for three hours in water. Plough in the seed. It has no manure, and in three months ripens without farther trouble. Cut it down early in the morning, stack it for one day, and then dry it five days in the sun. Tread it out, and clean it with a fan. It preserves best in a store-house, but does not keep longer than one year. The forage is here reckoned inferior to *rági* straw. The produce in a good crop is fifteen-fold ; and in a middling one ten-fold.

In the south the two varieties, the red and the black, are always sown intermixed. In the last half of *Srávana*, plough three times. Sow broad-cast with the first rain of *Bhádrapada*. It requires no manure, and the seed is covered by a fourth ploughing. In three months it ripens without farther trouble, and is then pulled up by the roots, and stacked for eight days : after which it is spread in the sun to dry, and next day is trodden out by oxen. The seed for sowing must be well dried in the sun, and preserved in *múdes* ; the remainder is kept in pots, or in the *kanaja*. It is used for human food, either dressed as curry, or parched ; but the chief consumption of it is for cattle, both horses and bullocks. The straw is an excellent fodder, and is preferred even to that of *rági*. It is generally sown on the two worst soils, in fields that are never used for anything else ; but it also follows as a second crop after *jóla* ; or, when from want of rain the crop of *rági* has failed, the field is ploughed up and sown with horse-gram. In this case, the next crop of *rági* will be very poor, unless it be allowed a great quantity of manure. In places where the red and black horse-grains are kept separate, the black kind is sown from twelve to twenty days later than the other.

The only kind cultivated towards the north-east is the white. Except after *kár ellu*, or upon new ground, it never succeeds. The longer the ground has been waste, especially if it has been overgrown with small bushes of the *tangadi*, or *bandári* (*cassia auriculata* and *dodonea viscosa*), so much the better for *hurali*. It grows best upon ash-coloured soil, and next to that prefers a red soil, in which there is much sand. In *Srávana*, burn the bushes ; and either then, or in the course of the next month, plough once. After the next good rain sow the seed broad-cast, and plough the field across the former furrows.

The *hurali* at Sira is black and white mixed. It grows better on stony than on sandy soils; and gives the greatest crops when cultivated on land that has been waste, and over-run with bushes; but it also thrives tolerably on land that is alternately cultivated with it and *sáme*, or *saje*. In the month which precedes and that which follows the autumnal equinox, sow the seed broad-cast, and then cover it with the plough. In four months it ripens without farther trouble. Both straw and husks are reckoned good for labouring cattle; but they are said to be bad for milch cows.¹

Uddu—is of two kinds; *chik uddu*, and *dod uddu*. The *chik uddu* seems to be a variety, with black seeds. It is cultivated in Mysore District as follows:—The ploughing commences ten days after the feast *Sivarátri*, in February. Previous to the first ploughing, if there has not recently been any rain, the field must have a little water, and then it is three times ploughed. The seed is sown immediately before the third ploughing, by which it is covered. This crop obtains neither water, manure, nor weeding. The straw, when ripe, is pulled up by the roots, stacked for three days, dried two days in the sun, and then trodden out by bullocks. The flour, made into cakes, and fried in oil, is here a common article of diet. It is also mixed with rice flour, and made into white cakes called *dóse*, which are also fried in oil, and are a favourite food. The straw is reckoned pernicious to cattle. It is thrown on the dunghill, and serves to increase the quantity of manure. The grain is always preserved in the *múde*, or straw bag.

Dod uddu is also called *hain uddu*. It is cultivated and managed exactly like the other kind; but the first ploughing is on the eighth day after the *Swarna Gauri vrata*, in August. The sowing season is fifteen days afterwards. The straw is equally pernicious to cattle, but the grain is reckoned better than that of the *chik uddu*.

About Madgiri it grows best on a black soil, which it does not injure for the succeeding crop of *jóla*. Plough twice in Ashádhá or Srávana, the fourth and fifth months after the vernal equinox. After the next rain sow broad-cast, and plough in the seed. In three and a

¹ The following is the result of Professor Church's analysis of horse-gram:—

	In 100 parts unhusked		In 1 lb oz grs	
Water	11.0	...	1	333
Albuminoids	22.5	...	3	262
Starch	56.0	...	8	420
Oil	1.9	...	0	133
Fibre	5.4	...	0	378
Ash	3.2	...	0	224

The nutrient ratio is 1 : 2.7, and the nutrient co-efficient 83. The ash contains nearly one-third its weight of phosphoric acid.

half months it ripens without farther trouble. The straw is only useful as fodder for camels.

Dod uddu is cultivated in the west on good rági soils, and is taken as an alternate crop with that grain. After cutting the rági the field is ploughed once a month for a year. At the last ploughing some people sow the seed broad-cast, and cover it with the plough; others drop it into the furrow after the plough. In this last case, the young plants are always too thick; and when they are a month old, part of them must be destroyed by the hoe drawn by oxen. If sown broad-cast, the weeds at the end of a month must be removed by the hand. The broad-cast sowing gives least trouble. The drill *uddu* produces a little more. It ripens in three months.

The *chit̃tu*, or lesser *uddu*, is cultivated at the same season with the *kár rági*, and requires four months to ripen. Owing to a more luxuriant growth, even when sown broad-cast, it requires the use of the hoe drawn by oxen. It is not, however, so productive as the great *uddu*. Cattle eat the straw of *uddu* when mixed with the husks, and with those of *hurali*, *kadale*, *avare*, and *togari*, and with the spikes of *rági*, after these have been cleared of grain. This fodder is reckoned superior to even the straw of *rági*.

Hesaru.—It is of one kind only, but is cultivated in the south both as a *hain* and as a *kár* crop; in both of which the manner of cultivation is exactly the same as that of the *uddus*. The straw, being equally unfit for cattle, is reserved for manure. The grain is dressed as curry.

In the east it is commonly raised on dry field. It requires a black clay; and, although it have no manure, it does not injure the following crop of *rági*. In the course of a few days in *Vais'ákha*, plough twice, sow broad-cast, plough the seed, and harrow. In three months it ripens without farther trouble. It is then cut by the ground, stacked for six days, dried in the sun for four, and trodden out by oxen as usual. The grain, for use, is preserved in store-houses, and does not keep good more than two months, even although it be occasionally dried. The straw is totally useless, and will not even answer for manure.

The *hesaru* cultivated at *Sira* is called *kári*, or black, and requires a black soil, to which it is said to add much strength. It is therefore taken alternately with *navane*, or with *huchchellu*, both of which are considered as exhausting crops. It is cultivated exactly in the same manner as *hurali* is, and ripens in three months. Except for feeding camels, its straw or husks are of no use.

In a few places in *Shimoga* where there is a moist black soil, the rice-ground produces a second crop of *kadale*, and of *hesaru*. For the

hesaru, the field after the rice harvest must be ploughed twice. In the month following the shortest day, it must be watered from a reservoir, and smoothed with the implement called *koradu*. As a mark for the sower, furrows are then drawn through the whole field, at the distance of four cubits; and the seed having been sown broad-cast is covered by the plough. The field is then smoothed with the *koradu*, and in four months the crop ripens.

Wollellu—is cultivated near Seringapatam, and in some places is called *phulagana ellu*. It is raised exactly like the *kár uddu*, cut down when ripe, and stacked for seven days. It is then exposed to the sun for three days, but at night is collected again into a heap; and, between every two days drying in the sun, it is kept a day in the heap. By this process the capsules burst of themselves, and the seed falls down on the ground. The cultivators sell the greater part of the seed to the oil-makers. This oil is here in common use with the natives, both for the table and for unction. The seed is also made into flour, which is mixed with jaggory, and formed into a variety of sweet cakes. The straw is used for fuel and for manure.

In Kolar it is more commonly called *achchellu*, and is cultivated as follows. In Vais'ákha plough twice, without manure, sow broad-cast, and plough in the seed. In three months it ripens without farther trouble, is cut down by the ground, and is afterwards managed exactly like the *uddu*. The seed is preserved in the same manner. The produce in a good crop is twenty seeds, and in a middling one twelve. The straw is used for fuel.

North of the Túmkúr District are cultivated two kinds of *sesamum*, the *karu* or *wollellu*, and the *gur-ellu*. The last forms part of the watered crops; the *kar-ellu* is cultivated on dry field. The soil best fitted for it is *dare*, or stony land, which answers also for *sáme* and *hurali*. The ground on which *kar-ellu* has been cultivated will answer for the last-mentioned grain, but not so well as that which has been uncultivated. After it, even without dung, *sáme* thrives well. The same ground will every year produce a good crop of this *ellu*. If a crop of *ellu* is taken one year, and a crop of *sáme* the next, and so on successively, the crops of *ellu* will be poor, but those of *sáme* will be good. After the first rain that happens in Vais'ákha, which begins about the middle of April, plough three times. With the next rain sow broad-cast, and plough in the seed. In between four and five months, it ripens without farther trouble. The produce in a good crop is eighty-fold.

In the west the *kar-ellu* is sown on *rági* fields that consist of a red soil, and does not exhaust them. The field is ploughed as for *rági*,

but it is not allowed manure. The seed is mixed with sand, sown broadcast, and harrowed with the rake drawn by oxen. It ripens in four months without farther trouble. The seed is equal to half of the rági that would be sown on the same field. The produce is about twenty seeds. The straw is burned, and the ashes are used for manure.

Huchchellu.—or the *foolish-oil-plant*, is near Seringapatam most commonly sown after jóla as a second crop. When that has been reaped, plough four times in the course of eight days. Toward the end of Śrávaṇa, or about the middle of August, after a good rain, sow broadcast, and plough in the seed. It requires neither manure nor weeding, and ripens in three months. It is cut near the root and stacked for eight days. Then, having been for two or three days exposed to the sun, the seed is beaten out with a stick, and separated from fragments of the plant by a fan. The seed is kept in pots. Part of it is parched and made into sweetmeats with jaggory; but the greater part is sold to the oil-maker for expression. This oil is used in cookery, but is reckoned inferior to that of *wollellu*. The stems are a favourite food of the camel; but are disliked by the bullock, though want often forces this animal to eat them. When not used as a second crop after jóla, it is always sown on the two poorer soils.

The *huchchellu* near Bangalore is managed exactly in the same manner as the *wollellu*. The 70 seers measure require a little more water than the other *ellu*, and gives 65 seers of oil (or a little more than $4\frac{1}{2}$ gallons). This also is used for the table. The cake is never used for curry, but is commonly given to milch cattle.

Huchchellu is never sown at Kolar as a second crop. After the male, or heavy rains are over, plough once, sow broadcast, and plough in the seed. It gets no manure, and in three months ripens without farther trouble. It is then cut down near the root, stacked for six days, dried in the sun for three, and trodden out. The seed is preserved in store-houses; the straw is used only as manure.

In Madgiri *huchchellu* is sown in places called *javugu*, or sticking-land, which are situated at the bottom of rocks; from whence in the rainy season the water filters, and renders the soil very moist. In such places nothing else will thrive. When the rain has set in so late as to prevent the cultivation of anything else, the *huchchellu* is sown also on any land, especially on rági fields. On such soils, however, it does not succeed. In Bhádrapada or Asvija (from about the middle of August till about that of October), plough once, sow broadcast, and plough in the seed, which ripens in four months.

Haralu.—Two varieties of it are common; the *chikka*, or little haralu, cultivated in gardens; and the *dodda*, or great haralu, that is

cultivated in the fields. To grow the latter :—In the spring, plough five times before the 15th of Vais'ákha. With the first good rain that happens afterwards, draw furrows all over the field at a cubit's distance ; and having put the seeds into these at a similar distance, cover them by drawing furrows close to the former. When the plants are eight inches high, hoe the intervals by drawing the *kunte* first longitudinally, and then transversely. When the plants are a cubit and a half high, give the intervals a double ploughing. The plant requires no manure, and in eight months begins to produce ripe fruit. A bunch is known to be ripe by one or two of the capsules bursting ; and then all those which are ripe are collected by breaking them off with the hand. They are afterwards put into a heap or large basket ; and the bunches, as they ripen, are collected once a week, till the commencement of the next rainy season, when the plant dies. Once in three weeks or a month, when the heap collected is sufficiently large, the capsules are for three or four days spread out to the sun, and then beaten with a stick to make them burst. The seed is then picked out from the husks, and either made by the family into oil for domestic use, or sold to the oil-makers. It is cultivated on the two best qualities of land, and on the better kinds of *maralu*. When the same piece of ground is reserved always for the cultivation of this plant, the succeeding crops are better than the first ; when cultivated alternately with *rági*, it seems neither to improve nor injure the soil for that grain.

In Kolar District both the great and small kinds are cultivated ; but, although the mode of cultivation is the same for both, they are always kept separate. In the beginning of the female or slight rains plough twice. When the rains become heavy, plough again ; and then, at the distance of three-quarters of a cubit from each other in all directions, place the seeds in the furrows. When the plants are a span high, weed with the plough, throwing the earth up in ridges at the roots of the plants. At the end of the first and second months from the former weeding, repeat this operation. In four months it begins to give ripe fruit ; and once in four days the bunches that are ripe are collected in a pit until a sufficient quantity is procured. It is then exposed to the sun, and the husks are beaten off with a stick. In the May following, the plant dries up, and is cut for fuel. It is only cultivated in the good *rági* soils, which it rather improves for that grain, although it gets no dung. The small kind is reckoned the best, and most productive.

Haralu is cultivated in the north-east on a particular soil, which is reserved for the purpose, and consists of ash-coloured clay mixed with sand. There are here in common use three kinds of *haralu* ; the *phola* or field ; and the *doḍḍa*, and *chittu*, which are cultivated in

gardens. A red kind is also to be seen in gardens, where it is raised as an ornament. The *chit haralu* produces the best oil. Next to it is the *phola* that is cultivated in the fields. In the course of a few days, any time in the three months following the vernal equinox, plough three times. With the next rain that happens, plough again, and at the same time drop the seeds in one furrow at the distance of one cubit and a half, and then cover them with the next furrow. A month afterwards hoe with the *kunte*, so as to kill the weeds, and to throw the earth in ridges toward the roots of the plant. It ripens without farther trouble. At the time the *haralu* is planted, seeds of the pulses called *avare* and *togari* are commonly scattered through the field. In four months after this, the *haralu* begins to produce ripe fruit, and for three months continues in full crop. For two-months more it produces small quantities.

Haralu, of the kind called *phola*, is cultivated at Sira. For this a sandy soil is reckoned best; and as it is thought to improve the soil, the little *rági* that is sown on dry field generally follows it. In the first month after the vernal equinox, plough twice; then, with the first rain in the next month, at every cubit's distance throughout the field, draw furrows intersecting each other at right angles. At every intersection drop a seed, and cover them with another furrow. After two months weed with the plough; and with the *kunte*, or hoe drawn by oxen, throw the earth in ridges toward the young plants. In six months it begins to give ripe fruit, which for three months is gathered once a week.

Sanabu.—For the cultivation of this plant as pursued in the Bangalore District, the soil ought to be red or black, like the best kind used for cultivation of *rági*. It is allowed no manure; and the seed is sown broad-cast on the ground, without any previous cultivation, at the season when the rains become what the natives call *male*, that is to say, when they become heavy. After being sown, the field is ploughed twice, once lengthwise, and once across; but receives no farther cultivation. At other times the *sanabu* is cultivated on rice-ground in the dry season; but it must then be watered from a canal or reservoir. It requires four months to ripen, which is known by the seeds having come to full maturity. After being cut down, it is spread out to the sun, and dried. The seed is then beaten out by striking the pods with a stick. After this, the stems are tied up in large bundles, about two fathoms in circumference, and are preserved in stacks or under sheds.

Cotton.—The soil on which it is sown at Sira is a black clay containing nodules of limestone. In the two months following the vernal

equinox, plough three times. At any convenient time, in the two next months, mix the seed with dung, and drop it in the furrows after the plough, forming lines about nine inches apart. A month afterwards plough again between the lines; and in order to destroy the superfluous plants and weeds, use the hoe drawn by oxen three times, crossing these furrows at right angles. The second and third times that this hoe is used, it must follow the same track as at first, otherwise too many of the plants would be destroyed. Between each hoeing three or four days should intervene. In six months the cotton begins to produce ripe capsules, and continues in crop four more. The plants are then cut close to the ground; and after the next rainy season the field is ploughed twice in contrary directions. A month afterwards it is hoed once or twice with the same implement, and it produces a crop twice as great as it did in the first year. In the third year a crop of *sáme* or *navane* must be taken, and in the fourth year cotton is again sown as at first.

The principal crop in the fine country towards Narsipur and Talkad is cotton, which there is never raised in soil that contains calcareous nodules. The black soil that is free from lime is divided into three qualities. The first gives annually two crops, one of *jóla* and one of cotton; the two inferior qualities produce cotton only.

Cotton is raised towards Harihar entirely on black soil, and is either sown as a crop by itself, or drilled in the rows of a *navane* field. In the former case, two crops of cotton cannot follow each other, but one crop of *jóla* at least must intervene. In the second month after the vernal equinox, the field is ploughed once, then manured, then hoed with the *heg kunte*; and the grass is kept down by occasional hoeings with the *bolu kunte*, until the sowing season in the month preceding the autumnal equinox. The seed is sown by a drill having only two bills, behind each of which is fixed a sharp-pointed bamboo, through which a man drops the seed; so that each drill requires the attendance of three men and two oxen. The seed, in order to allow it to run through the bamboo, is first dipped in cow-dung and water, and then mixed with some earth. Twenty days after sowing, and also on the thirty-fifth and fiftieth days, the field is hoed with the *edde kunte*. The crop season is during the month before and that after the vernal influence.

Tobacco is sown in Banavar in the dry field cultivated for *rági* and other similar grains, of which a crop must intervene between every two crops of tobacco. When the season proves very wet, it cannot be cultivated, and it requires a good *rági* soil. A few small stones do no harm, but it will not grow on the hard soil called *dare*; and, in fact,

the soil of the first quality is that usually employed, though sometimes the tobacco is planted on the best fields of the second quality. In the three months following the vernal equinox, the field ought, if possible, to be ploughed ten times; but some of these ploughings are often neglected. After the fourth or fifth time, sheep and cattle must for some nights be kept on the field for manure. During the last fifteen days of the second month after midsummer, small holes are made throughout the field. They are formed with the hand, and disposed in rows distant from each other $1\frac{1}{2}$ cubit; and in every hole a young tobacco plant is set. This being the rainy season, the tobacco requires no watering, unless during the first ten days from its having been transplanted there should happen to be two successive fair days. In this case, on the second fair day, water must be given with a pot. On the fifteenth day a little dung is put into each hole, and the field is hoed with the *kunte*. Every fourth or fifth day, until the tobacco is cut, this is repeated, so as to keep the soil open and well pulverized. At the end of a month and a half, the top shoots of the plants are pinched off, and every eight or ten days this is repeated; so that six or seven leaves only are permitted to remain on each stem. In the month preceding the shortest day, it is fit for cutting.

The stems are cut about four or five inches from the ground, and are then split lengthwise; so that each portion has three or four leaves. These half stems are strung upon a line, which is passed through their root ends; and then for twenty days they are spread out to the sun and air. Every third day they are turned, and they must be covered with mats should there happen to be rain; but at this season that seldom comes. The tobacco is then taken into the house, put into a heap, and turned four or five times, with an interval of three days between each time. It is then fit for sale, and by the merchants is made up into bundles which include the stems.

In order to prepare the seedlings, a plot of ground must be dug in the month which precedes the longest day. It must be then cleared from stones, and separated by little banks into squares for watering, in the same manner as in this country is done to kitchen gardens. The tobacco seed is then mixed with dung, and sown in the squares, which are smoothed with the hand, sprinkled with water, and then covered with branches of the wild date. Every third day it must be watered. On the eighth day the plants come up, and then the palm branches must be removed. If the plants be wanted soon, they ought to have more dung, and to be kept clear from weeds. With this management, they are fit for transplanting in from a month to six weeks. If they are not wanted for two months, or ten weeks, the second dunging is omitted, and the

growth of the plants is checked by giving them no water for eight days after they come up.

Sasive is a mustard which is always sown, in the east, mixed with rági. It ripens sooner than that grain; and, when dry, the branches are broken with the hand, exposed two days to the sun, and then beaten out with a stick. In this country, oil is never made from the seed, as is usual in Bengal; it is employed as a seasoning in curries and pickles.

Kadale always requires a black mould; and is cultivated, in the west, partly as a second crop after rági, and partly on fields that have given no other crop in the year. In this case, the produce is much greater, and the manner of cultivation is as follows:—In the two months preceding the autumnal equinox, the rági having been cut, the field is ploughed once a month for fourteen or fifteen months. Then in the course of four or five days plough twice. After the last ploughing, drop the seed in the furrows at six inches distance from each other, and it ripens without farther trouble. The seed is sown as thick as that of rági.

It is a considerable crop in the south-east of the Mysore District, but so exhausts the soil of even the richest fields that it is seldom taken from the same ground oftener than once in seven years. It is generally sown after jóla in place of cotton, and must be followed by wheat, wollellu or rági. The two former may be followed by cotton, the rági cannot. In the third year, when rági has been used, the field is sown with navane or jóla, succeeded as usual by cotton. Immediately after the jóla has been cut, which is about the autumnal equinox, the field is ploughed once, then dunged, and then ploughed three times, all in the course of a month. In the beginning of the second month after the autumnal equinox, the kadale is sown in drills like the cotton; but the drills are only half a cubit distant. Between the drills, on the fifteenth day, the hoe drawn by oxen is used. On the thirtieth the weeds are removed by the *kale kudagolu*. If the soil be rather hard, about the thirty-third day the hoe drawn by oxen must be again used. In four months the *kadale* ripens. Kadale is sometimes sown after a fallow; in which case the ground is prepared in a similar manner as for cotton in the two poorer soils.

Towards Harihar, a few rich spots are reserved solely for the cultivation of *kadale*, and these are cultivated in the following manner:—In the month following the vernal equinox the field is ploughed once, then manured, and in the following month is hoed with the *heg kunte*. Between that period and the month preceding the shortest day, the grass is ploughed down twice, and the seed is sown with the sharp

bamboo following the plough, and covered with the *heg kunte*. It ripens in three months.¹

Wheat.—There are two kinds cultivated, *jave gódhi* (*triticum monococcum*) and *hotte gódhi* (*triticum spelta*). For the former, in Kolar, the ground is sometimes ploughed five times; and sometimes dug with the hoe called *kol gudali* to the depth of one cubit, which is reckoned preferable. In Jyésztha (May—June) the seed is sown broad-cast, and covered with the hoe. Channels and squares are then formed, and the ground is smoothed with the hand and dunged; while such of the seed as may happen to be above the ground is pushed down with the finger. In forty-five days the field must be watered nine times. It is then weeded with the instrument called *woravari*; after which one watering in six days suffices. It ripens in three months, is cut, tied up in small sheaves, and stacked for four days. It is then dried one day in the sun, and thrashed out by beating the sheaves against a log of timber. To separate the awns, the grain is then beaten with a stick. In the fields of wheat, radishes are planted on the mounds which divide the squares.

In the black clay in Madgiri, wheat of the kind called *jave-godhi* is the most common crop. It is but a poor grain, and five-twelfths of it consist of husks. Any time in Pushya (Dec.—Jan.) plough once; next day, if there be no rain, water the field, and plough again across, dropping the seed in the same manner as in sowing jóla. The plots must be formed in the same manner. It gets no manure nor weeding, and requires only three waterings, on the fortieth, sixtieth and eightieth days. It is much subject to disease, and not above one crop in four is good. After reaping the wheat, the field, in order to expose the soil to the rain, must be immediately ploughed.

In Sira, in place of the *Vaisákha* crop, when there is a scarcity of water, wheat, both *jave* and *hotte*, are sown on rice-lands. These grains may be followed by a *Kártika* crop of rági; but by this process the ground is as much exhausted, as if it had been sown with navane. If

¹ Professor Church gives the following analysis of the composition of chick pea, or Bengal gram:—

	In 100 parts			In 1 lb husked
	Husked	with husk		
Water ...	11.5	11.2	...	1 oz 367 grs
Albuminoids ...	21.7	19.5	...	3 ,, 207 ,,
Starch ...	59.0	53.8	...	9 ,, 192 ,,
Oil ...	4.2	4.6	...	0 ,, 294 ,,
Fibre ...	1.0	7.8	...	0 ,, 70 ,,
Ash ...	2.6	3.1	...	0 ,, 182 ,,

The ash of husked contains 1.1, and of unhusked 0.8 of phosphoric acid. The nutrient ratio of the unhusked peas is 1 : 3.3; the nutrient value 84.

the *Kártika* crop be altogether left out, the *Vais'ákha* crop of rice following wheat will be as good as if the ground had been regularly cultivated for rice alone ; and in India it is a commonly received opinion, that where a supply of water admits of it, ground can never be in such good heart as when regularly cultivated by a succession of rice crops. Wheat requires a clay soil, and the manner of cultivating both kinds is the same. In the two months preceding, and the one following the autumnal equinox, plough five times. In the following month, after a rain, or after having watered the field, plough again, and drop the seed into the furrows. Then divide it into squares, as for *jóla*, and water it once a month. The straw is only used for fire. If given to cattle for fodder, it is supposed capable of producing the distemper.

A very small quantity of the wheat called *jave godhi* is raised near Periyapatna on fields of a very rich soil, from which alternate crops of *kadale* and of it are taken. The manure is given to the *kadale* ; but wheat requires none. From the winter to the summer solstice plough once a month. Then in the following month plough twice, sow broadcast, and cover the seed with the plough. It ripens in four months without farther trouble.

The wheat raised near Narsipur in the Mysore District is of the kind called *hotte gódhi*, and there are two seasons for its cultivation, the *hain* and *kár*. It is sown on the best soil only, and always after a crop of *kadale*. The *kár* season, when the rains set in early, is always preferred, not only as the wheat is then more productive, but as in the same year it may be followed by a crop of cotton, which is not the case with the *hain* wheat. In the two months following the vernal equinox, the field for *kár* wheat is dinged, ploughed two or three times, and then hoed with the *kunte*, which is drawn by oxen. The seed is then sown, in drills one cubit distant, by dropping it in the furrow after a plough. On the fifteenth, twenty-eighth and thirty-fifth days the hoe is again used, and two or three days afterwards the weeds are removed by the *kale kudagolu*. This wheat ripens in three months and a half, and is immediately followed by a crop of cotton. The wheat is liable to be spoiled by a disease called *arsina mári* ; owing to which, in the course of one day, it becomes yellow and dies.

When the rains are late in coming, the *hain* crop of wheat is taken after *kadale*. Cotton cannot be taken in the same year. The manner of cultivation is the same as for the *kár* crop, only the season is different. The ploughings are performed in the month which precedes the autumnal equinox, or in the beginning of that which follows. At the end of this month the seed is sown. The produce is about one-half only of that of the *kár* crop.

Rice.—Of the varieties of this grain 108 specimens have been collected in the Government Museum, each bearing its appropriate vernacular name. There are three modes of sowing the seed, from whence arise three kinds of cultivation. In the first mode the seed is sown dry on the fields that are to rear it to maturity: this is called the *bara batta* or *puṇaji*. In the second mode the seed is made to vegetate before it is sown; and the field when fitted to receive it is reduced to a puddle: this is called *moḷe batta*. In the third kind of cultivation the seed is sown very thick in a small plot of ground; and when it has shot up to about a foot high, the young rice is transplanted into the fields where it is to ripen: this is called *nāṭi*.

The kinds of rice cultivated at Seringapatam are as follow:—*doḍḍa batta*, *hoṭṭe kembatti*, *arsina kembatti*, *sukādās*, *murarjila*, *yálakki raja*, *konavali*, *bili sanna batta*, *putta batta*, *kari kallu*. With the exception of the first, which takes seven months, all the other kinds ripen in five and a half months.

In the hain crop the following is the management of the dry-seed cultivation. During the months Phálguna, Chaitra and Vais'ákha, that is from February till May, plough twice a month; having, three days previous to the first ploughing in Phálguna, softened the soil by giving the field water. After the fourth ploughing the field must be manured with dung, procured either from the city or cow-house. After the fifth ploughing the fields must be watered either by rain or from the canal; and three days afterwards the seed must be sown broad-cast and then covered by the sixth ploughing. Any rain that happens to fall for the first thirty days after sowing the seed must be allowed to run off by a breach in the bank which surrounds the fields; and should much rain fall at this season, the crop is considerably injured. Should there have been no rain for the first thirty days, the field must be kept constantly inundated till the crop be ripe; but if there have been occasional showers the inundation should not commence till the forty-fifth day. Weeding and loosening the soil about the roots of the young plants with the hand, and placing them at proper distances, where sown too close or too far apart, must be performed three times; first on the forty-fifth or fiftieth day; secondly twenty days afterwards; and thirdly fifteen days after the second weeding. These periods refer to the crops that require seven months to ripen. For rice which ripens in five and a half months, the field must be inundated on the twentieth day; and the weedings are on the twentieth, thirtieth and fortieth days.

In the hain crop the following is the manner of conducting the sprouted-seed cultivation. The ploughing season occupies the month of Asháḍha (June—July). During the whole of this time the field is

inundated and is ploughed four times ; while at each ploughing it is turned over twice in two different directions, which cross each other at right angles. This may be called double ploughing. About the 1st of Srāvana the field is manured, immediately gets a fifth ploughing, and the mud is smoothed by the labourers' feet. All the water except one inch in depth must then be let off, and the prepared seed must be sown broad-cast. As it sinks in the mud it requires no labour to cover it. For the first twenty-four days the field must once every other day have some water, and must afterwards, until ripe, be kept constantly inundated. The weedings are on the twenty-fifth, thirty-fifth and fiftieth days. In order to prepare the seed it must be put into a pot, and kept for three days covered with water. It is then mixed with an equal quantity of rotten cow-dung, and laid on a heap in some part of the house, entirely sheltered from the wind. The heap is well covered with straw and mats ; and at the end of three days the seed, having shot out sprouts about an inch in length, is found fit for sowing. This manner of cultivation is much more troublesome than that called dry-seed : and the produce from the same extent of ground is in both nearly equal ; but the sprouted-seed cultivation gives time for a preceding crop of pulse on the same field, and saves a quarter of the seed.

Two distinctions are made in the manner of cultivating transplanted rice ; the one called *baravāgi* or by *dry plants* ; and the other called *nirāgi* or by *wet plants*. For both kinds low land is required.

The manner of raising the dry-seedlings for the hain crop is as follows :—Labour the ground at the same season, and in the same manner as for the dry-seed crop. On the 1st of Jyēshta, or in May, give the manure, sow the seed very thick and cover it with the plough. If no rain fall before the eighth day, then water the field, and again on the twenty-second ; but if there are any showers these waterings are unnecessary. From the forty-fifth till the sixtieth day the plants continue fit to be removed. In order to be able to raise them for transplanting, the field must be inundated for five days before they are plucked. The ground on which the dry-seedlings are to be ripened is ploughed four times in the course of eight weeks, commencing about the 15th of Jyēshta ; but must all the while be inundated. The manure is given before the fourth ploughing. After this, the mud having been smoothed by the feet, the seedlings are transplanted into it, and from three to five plants are stuck together into the mud at about a span distance from the other little bunches. The water is then let off for a day : afterwards the field, till the grain is ripe, is kept constantly inundated. The weedings are performed on the twentieth, thirty-fifth and forty-fifth days after transplanting.

The manner of raising the wet-seedlings for the transplanted crop in the hain season is as follows :—In the month Phálguna (Feb.—Mar.) plough the ground three times, while it is dry. On the 1st of Jyésztha inundate the field ; and in the course of fifteen days plough it four times. After the fourth ploughing smooth the mud with the feet, sow the seed very thick and sprinkle dung over it : then let off the water. On the third, sixth and ninth days water again ; but the water must be let off and not allowed to stagnate on the field. After the twelfth day inundate until the seedlings be fit for transplantation, which will be on the thirtieth day from sowing. The cultivation of the field into which the seedlings are transplanted is exactly the same as that for the dry-seedlings. The plot on which the seedlings are raised produces no crop of pulse ; but various kinds of these grains are sown on the fields that are to ripen the transplanted crop, and are cut down immediately before the ploughing for the rice commences. The produce of the transplanted crop is nearly equal to that of the dry-seed cultivation ; and on a good soil, properly cultivated, twenty times the seed sown is an average crop.

The kár crops, according to the time of sowing, are divided into three kinds. When the farm is properly stocked, the seed is sown at the most favourable season, and the crop is then called the *Kumba kár* ; but if there be a want of hands or cattle, part of the seed is sown earlier, and part later than the proper season ; and then it produces from thirty to fifty per cent. less than the full crop. When sown too early the crop is called *Tula kár* ; when too late it is called *Mészha kár*. The produce of the *hain* and *Kumba kár* crops is nearly the same.¹

No *Tula kár* dry seed is ever sown. The ploughing season for the *Kumba kár* dry seed is in Bhádrapada (August), and the seed is sown about the end of Márgasira (December). In the *Mészha kár* dry-seed the ploughing commences on the 1st of Chaitra (March), and the seed is sown at the feast of Chitra Purnami in April. The *Tula kár* sprouted seed is sown on the 1st Kártika (October), the ploughing having commenced with the feast Navarátri, in September. The *Kumba kár* sprouted seed is sown in Pushya, about the 1st of January. The ploughing season occupies a month. The ploughing for the *Mészha kár* sprouted seed commences about the 15th of Chaitra. The seed is sown about the 16th of Vais'ákha (May). The *Kumba kár* transplanted rice is cultivated only as watered seedlings. The ground for the seedlings begins to be ploughed in the end of Kártika or middle of November, and the seed is sown on the 15th Pushya or end of December. The fields on which this crop is ripened are begun

¹ *Kumba* or *Kumbha* is the sign Aquarius ; *Tula* is Libra ; and *Mészha* is Aries.

to be ploughed in the middle of *Márgasira* (1st December). The transplanting takes place about the 15th of *Mágha* or end of January. The *Tula-kár* transplanted rice also is sown *nirági* about the 30th of *Asvija* or middle of October, and in a month afterwards is transplanted. The *Mésha-kár* transplanted rice is also sown as watered seedlings, about the 15th of *Vaisákha* (May), and about a month afterwards is transplanted. The regular *kár* crop of the transplanted cultivation does not interfere with a preceding crop of pulse; but this is lost, when from want of stock sufficient to cultivate it at the proper time the early or late seasons are adopted. The various modes of cultivating the rice give a great advantage to the farmer; as by dividing the labour over great part of the year fewer hands and less stock are required to cultivate the same extent of ground than if there was only one seed-time, and one harvest.

The manner of reaping and preserving all the kinds of rice is nearly the same. About a week before the corn is fit for reaping, the water is let off, that the ground may dry. The corn is cut down about four inches from the ground with a reaping-hook called *kudagolu* or *kudagu*. Without being bound up in sheaves it is put into small stacks, about twelve feet high; in which the stalks are placed outwards and the ears inwards. Here the corn remains a week, or if it rains, fourteen days. It is then spread out on a threshing-floor made smooth with clay, cow-dung and water, and is trodden out by driving bullocks over it. If there has been rain, the corn, after having been threshed, must be dried in the sun; but in dry weather this trouble is unnecessary. It is then put up in heaps called *ráshi*, which contain about 60 kandagas, or 334 bushels. The heaps are marked with clay and carefully covered with straw. A trench is then dug round it to keep off the water. For twenty or thirty days (formerly, till the division of the crop between the Government and the cultivator took place) the corn is allowed to remain in the heap.

The grain is always preserved in the husk, or, as the English in India say, in *paddy*. There are in use here various ways for keeping paddy. Some preserve it in large earthen jars that are kept in the house. Some keep it in pits called *hagevu*. In a hard stony soil they dig a narrow shaft, fifteen or sixteen cubits deep. The sides of this are then dug away so as to form a cave with a roof about two cubits thick. The floor, sides and roof are lined with straw; and the cave is then filled with paddy. These pits contain from fifteen to thirty kandagas. When the paddy is wanted to be beaten out into rice, the whole pit must at once be emptied. Other people again build *kanajas*, or store-houses, which are strongly floored with plank to keep out the

bandicoots or rats. In these store-houses there is no opening for air ; but they have a row of doors one above another, for taking out the grain as it is wanted. Another manner of preserving grain is in small cylindrical stores, which the potters make of clay, and which are called *wóde*. The mouth is covered by an inverted pot ; and the paddy, as wanted, is drawn out from a small hole at the bottom. Finally, others preserve their paddy in a kind of bags made of straw, and called *múde*. Of these different means the *kanaja* and *wóde* are reckoned the best. Paddy will keep two years without alteration, and four years without being unfit for use. Longer than this does not answer, as the grain becomes both unwholesome and unpalatable. No person here attempts to preserve rice any length of time ; for it is known by experience to be very perishable. All the kinds of paddy are found to preserve equally well. That intended for seed must be beaten off from the straw as soon as cut down, and dried for three days in the sun, after which it is usually kept in straw bags.

There are two manners of making *paddy* into rice ; one by boiling it previously to beating ; and the other by beating alone. The boiling is also done in two ways. By the first is prepared the rice intended for the use of *rájas*, and other luxurious persons. A pot is filled with equal parts of water and paddy, which is allowed to soak all night, and in the morning is boiled for half an hour. The paddy is then spread out in the shade for fifteen days, and afterwards dried in the sun for two hours. It is then beaten, to remove the husks. Each grain is broken by this operation into four or five pieces, from whence it is called *aidu núgu akki*, or five-piece rice. When dressed, this kind of rice swells very much. It is always prepared in the families of the *rájas*, and is never made for sale. The operation is very liable to fail ; and in that case the rice is totally lost.

Rice prepared by boiling in the common manner is called *kudupal akki*, and is destined for the use of the Sudras, or such low persons as are able to procure it. Five parts of paddy are put into a pot with one part of water, and boiled for about two hours, till it is observed that one or two of the grains have burst. It is then spread out in the sun for two hours ; and this drying is repeated on the next day ; after which the paddy is immediately beaten. Ten parts of paddy, by this operation, give five parts of rice, of which one part goes to the person who prepares it, for his trouble. Ten seers of paddy are therefore equal in value to only four seers of rice.

The rice used by the Brahmans, and called *hasi akki*, is never boiled. On the day before it is to be eaten, the paddy must be exposed two hours in the sun. If it were beaten immediately after

being dried, the grain would break, and there would be a considerable loss. Even with this precaution many of the grains break ; and, when these are separated from the entire rice to render it saleable, the *hasi akki* sells dearer than the *kudupal akki*, in the proportion of nine to eight.

The beating is performed chiefly by women. They sometimes, for this purpose, use the *yáta*, or a block of timber fastened to a wooden lever, which is supported on its centre. The woman raises the block by pressing with her foot on the far end of the lever, and by removing her foot allows the block to fall down on the grain. The more common way, however, of beating paddy, is by means of a wooden pestle, which is generally about four feet in length, and three inches in diameter, which is made of heavy timber, and shod with iron. The grain is put into a hole formed in a rock or stone. The pestle is first raised with the one hand, and then with the other ; which is very hard labour for the women.

The kinds of rice cultivated at Mandya are *doḍḍa batta*, *putta batta*, *hote kembatti*, *konawali*, and *mulu batta*. The first four take each five months to ripen, and the last, three. Every kind may be cultivated, either as *hain* or *kár*. The *mulu batta* is never sown except when there is a deficiency of water. The only cultivation here is the *mole batta*, or sprouted-seed ; the manner of preparing which is as follows : Steep the seed in water all night ; next morning mix it with cow-dung, and fresh plants of the *tumbe soppu* (*phlomis esculenta*), and put it in a *múde*. On the *múde* place a heavy stone, and on the two following days sprinkle it with water. On the third day it is fit for sowing.

For the *hain* crop, the ploughings, from about the 1st of June till the middle of July are nine in number. Dung and leaves are then put on the field, and trampled into the mud. The water is now let off, until no more than a depth of one inch remains ; afterwards, the seed is sown and a slight sprinkling of dung laid over it. A watering once in three days is then given ; and after the third time, the field is inundated till the grain ripens. The weeds are removed on the twentieth, fortieth and sixtieth days. The *kár* cultivation is exactly the same, only the ploughings are in November and December. In both kinds of cultivation, and in every species of rice, an equal quantity of seed is sown on the same extent of ground, and the produce is nearly equal.

Of the different kinds of rice cultivated at Maddur *arisina kembatti*, *putta battu*, *yálakki rája*, *sukadas*, *konawali*, and *murarjila*, are equal in produce. The first four ripen in $4\frac{1}{2}$ months, the next in five, and

the last in six. The produce on first quality of soil is 114 seeds, on second quality 100 seeds, and on third, half that quantity. *Hote kembatti* and *dodda* or *bili batta*, which ripen in five months, produce 100, 70 or 40 fold, according to quality of soil. All the kinds of rice may be raised either as hain or kár crops, or the mole or náti modes of cultivation. No *punaji* is ever attempted. The seedlings for transplantation, in the náti cultivation, are always raised as nirági. The produce of the same kind of rice in the same soil, whether cultivated as hain or kár, or as mole or náti, is nearly the same.

The seasons for cultivating rice in the Kolar District are two; and the two crops, from the months in which they ripen, are named the *Kártika* and *Vais'ákha*. In this neighbourhood no rice is transplanted. When the seed is sown dry, the cultivation is called *puledi*; when it is prepared by being sprouted, it is called *mole*.

The only kind of rice cultivated as *puledi*, or dry seed, is the *dodda baira*; and it is only sown in this manner for the *Kártika* crop. In the course of *Vais'ákha* and *Jyésztha* plough the ground without water four times. About the end of the latter month (June), after a day's rain, sow the seed broad-cast, and cover it with the plough. Then harrow the field with the implement called *halive*. The crop has no manure, and the field is not inundated till the end of the second month; when it must be harrowed again, and the weeds removed by the hand. A good crop of this is reckoned fifteen seeds, a middling one ten seeds.

The *mole* for the *Kártika* crop is cultivated as follows: In *Ashádha*, and the first half of *Srávana*, plough from seven to nine times, the field being always inundated. Then manure it, either with leaves or dung; both are rarely given: but, could they be procured, this would greatly increase the produce. Then let out all the water, except two inches in depth, and sow the prepared seed broad-cast. Next day the field is dried, and sprinkled with some dung. At the end of three days it is covered with water for four hours. On the seventh, water the field for a whole day. After the tenth day, it must be kept constantly inundated to the depth of two inches. At the end of the month harrow it once lengthwise; on the third day harrow it across; and on the fifth day harrow again lengthwise. Four days afterwards weed with the hand, and repeat this after an interval of two weeks.

All kinds of rice are cultivated in the same manner. The rice for seed, after being trodden out, must be dried three or four days in the sun; and may be kept either in a straw *múde*, or in a store called *kanaja*. When it is to be prepared, it must be dried one day in the sun; then soaked a night in water; the next morning it must be mixed

with *haraḷu* leaves and dung, and tied up in straw. This is dipped in water, and placed under a large stone. In two days it must again be dipped, and is then fit for sowing. The produce of the *doḍḍa baira*, which is the common coarse grain of the country, is the greatest. A good crop of this is said to be fifteen seeds, and middling crop about ten seeds. The other kinds, on the same extent of ground, produce eight or ten seers less.

The *mole* cultivation for the *Vais'ákha* crop is as follows: Having inundated the field, plough it five or six days during the course of the twenty days preceding the feast *Dipávaḷi*. In the course of the next month plough four times. Then let out all the water, except two inches in depth; manure with leaves; and, having trodden these well into the mud, sow the prepared seed broad-cast. Next day dry the field, and manure it with duug. Three days after, water for two hours. Then every second day, for three times, water for four or five hours. Afterwards keep the field inundated. At the end of the month harrow, with the *halive*, three times in three directions, with a day's rest between each harrowing. A week afterwards weed with the hand, and in two weeks repeat this operation. This is the most productive crop, and gives from one to two seeds more than that which is reaped in *Kártika*.

The mode of cultivation, or the season of sowing, makes no difference here in the quality of the grain, nor in the length of time that it will keep good. The grain is always preserved in the husk; and until wanted for immediate consumption, is never beaten. In store-houses, or *kanajas*, if well dried in the sun previous to its having been put up, it preserves well for two years. Paddy is sometimes kept in pits, or in the straw packages called *múdes*; but these are inferior to the store-house.

At Madgiri, when there is plenty of water, the same ground in the course of the year gives two crops, the *Kártika* and *Vais'ákha*. The former, provided two crops are taken, is the most productive; but, if the *Kártika* be omitted, the *Vais'ákha* gives a greater return than the *Kártika* alone would have given; not, however, equal to the produce of both crops. The quality of the grain in both crops is the same. The *Vais'ákha* crop, although raised in the dry season, is the one most regularly taken. For this crop all the kinds of rice may be sown; for the *Kártika* crop the *bili sanna batta* and *kari channangi* are never sown; as with rain they are apt to lodge. The soil used for *tripati sanna batta*, *bili channangi*, *kari channangi*, and *put raj*, is *maralu* or sandy. The others require a clay, which in the low grounds is always black. The red soil is always confined to the rising grounds, and is

therefore never cultivated for rice, except when it can be watered by machines; and if the water is more than $31\frac{1}{2}$ feet from the surface, these are never used. Two men and four oxen can, by means of the machine called *kapile*, supply an acre and a half of ground with water sufficient to raise a crop of rice. One set works four or five hours in the morning, and the other as much in the evening.

The only manner of cultivating rice that is in use here is the *mole*, or sprouted-seed; the manner of preparing which is as follows:—The ears must be cut off, the grain beaten out immediately, and then dried in the sun three or four days. It must be preserved in straw or in jars. When wanted for sowing, it must be exposed to the sun for a day, and soaked in water all the following night. It is then put upon a layer of the leaves of the *yekka* (*calotropis gigantea*), or of *haralu*, mixed with sheep's dung, and is surrounded by stones, so as to keep it together. It is then covered with *banddri* (*dodonæa viscosa*) leaves, and pressed down with a stone. Next morning the upper leaves are removed, and a pot of water is thrown on the seed, which must be turned with the hand, and then covered again with the leaves and stone. Daily, for three or four times, this operation must be repeated, and then the sprouts from the seed will be almost an inch long.

For the *Kártika* crop plough seven times in the course of thirty days, the ground all the while being inundated. In the next place manure the ground with leaves, and tread them into the mud. Then let off the water, and sow the seed broad-cast, covering it with a little dung. On the fourth day cover the ground with water, and immediately afterwards let it run off. Repeat this daily till the eighth time, after which the field must be kept constantly inundated to the depth of one inch for ten days, and four inches for the remainder. The weedings are at the end of the sixth, tenth, and twelfth weeks from sowing. The season for ploughing continues all the months of Jyésztha and Ashádha.

For the *Vais'ákha* crop the same process is followed; but the ploughing season is from the 15th of Asvíja till the last of Margasira. By this time the whole seed must be sown; and the nearer it is done to it the better.

The large-grained rices, *dođda batta*, which ripens in $4\frac{1}{2}$ months, and *kari channangi* and *bili channangi*, which ripen in four months, produce in a good crop twenty-fold, and in an indifferent crop one-fifth less. *Kembatti* or *dođda kembatti*, and *garuda* or *sanna kembatti* yield twenty-three and thirteen-fold respectively in a good crop, or fifteen and seven-fold in an inferior one. The first ripens in five months, the second in four. Of the small-grained rices, *bili sanna batta*, *kari sanna*,

batta, *put raj* and *tripati sanna batta*, the first ripens in five months, the second in five and a half, the third in four, and the fourth in three and a half. Their respective yield in a good crop is twenty-four, thirty-two, fifteen and seventeen-fold.

In Periyapatna and the west the principal cultivation is the transplanted or *náti*, and by far the greatest quantity of rice cultivated is the *hain* crop or *anaputti*. The other kinds raised are *kembatti*, *konavali*, *sanna batta*, *sanna kembatta*, and *káru*; all ripen in six months, except the last, which ripens in five. The following is the manner of cultivating the *hain náti* or crop of transplanted rice growing in the rainy season:—The ground on which the seedlings are to be raised gets seven or eight ploughings between the middle of Vais'ákha and the 10th of Jyésztha, which are the second and third months after the vernal equinox. In the intervals between the ploughings the field is inundated; but at each time that operation is performed, the water is let off. After the last ploughing, manure with the leaves of the *chandra mallige* (*mirabilis*) or *ummatte* (*datura stramonium*); but, if these cannot be had, with the leaves of the *chaudangi* (*solanum*). Then tread the leaves into the mud, sow the seed very thick and cover it with dung. The seed is in general prepared for sowing by causing it to sprout: and the reason assigned for so doing is, that it is thereby secured from the birds. If the seed has been prepared, or *mole*, the field has water during the third, sixth, and ninth days, the water being allowed to remain on the field all day, and being again let off at night. On the tenth day the field is filled with water an inch deep and is kept so till the eighteenth, when that water is let off. Immediately afterwards the field is filled to three inches deep, and is kept thus inundated until the seedlings be fit for transplantation. If the seed be sown dry, it receives water on the first, second, and third days. On the fourth it has the manure which is given to the *mole*, when that is sown. It receives water again on the seventh, which is let off on the ninth. Water is again given on the thirteenth, seventeenth, and twenty-first; and the field is then inundated, until the seedlings are fit for transplantation. They must be transplanted between the thirtieth and forty-sixth days.

The ploughings for the fields into which the seedlings are to be transplanted are performed during the time in which these are growing; and are done exactly in the same manner as for the field in which the seed has been sown. Stiff ground requires eight ploughings; in a light soil six are sufficient. The manure is given before the last ploughing. The seedlings are pulled in the evening, and kept in water all night. Next morning the field has the last ploughing, and the mud is smoothed

by having a plank drawn over it. The seedlings are then planted, and get no water until the eighth day. On the eighth, twelfth, sixteenth and twentieth days the water is kept on the field, and is let off at night. The yellow colour occasioned by the transplantation is then changed into a deep green; after which, until the crop ripens, the field is constantly inundated. In a bad soil, the weeds are removed on the thirtieth day, in a good soil, on the forty-fifth.

The farmers here make their sprouted-seed in the following manner: The seed is soaked all night in water, and is then placed in a heap on a piece of sackcloth, or on some leaves of the plaintain-tree. There it is mixed with some buffalo's dung, and the leaves of the *burike* (*ocymum molle*), and covered with pack-saddles. In the evening it is sprinkled with warm water, and covered again. In the morning and evening of the second day it is sprinkled with cold water, and next day it is fit for sowing.

Every kind of rice that is sown in Nagar takes six months to grow; and they are of less variety than usual, namely, *bili batta* or *heggak*, and *jolaghena*, which may be cultivated both as dry-seed and as transplanted; and *honasena*, or *kempu*, which can be sown only as dry-seed.

The *bara-batta* cultivation is conducted as follows:—In the course of the five months following the winter solstice, the field gets four single ploughings. In the second month after the vernal equinox, it is manured with leaf-dung, and ploughed once. After the next rain, the seed is mixed with dry cow-dung, sown broad-cast, and covered by the implement called *koradu*. A month after sowing, when the young rice is about four inches high, the field is turned over with a small plough, to kill the grass and to destroy part of the young corn, which is always sown too thick. After this, the field is again smoothed with the same implement, and harrowed with a bunch of thorns. In the second month after the summer solstice, all the banks are repaired, to retain the water on the fields, which are then ploughed again and smoothed with the implement called *aligina koradu*. A large rake, called *halaku*, is then drawn by the hand over the field, to remove the weeds. In the month preceding the autumnal equinox, the weeds are removed by the hand. In the two months preceding the shortest day, the crop is ripe. It is cut close by the ground, and for four days is allowed to lie loose on the field. It is then stacked in heaps, with the ears inward, but without having been bound up in sheaves. In the course of three months, it is trampled out by oxen. The grain with the husk is preserved in store-houses, or straw bags, and is only made into rice as it may be wanted for immediate use.

The process for transplanted rice, called here *nitti*, is as follows:—

In order to raise the seedlings, in the course of fifteen or twenty days during the month following the vernal equinox, a plot is inundated, and ploughed four times. It is then manured with any kind of fresh leaves, and with the dung made by cattle that have been littered with dried leaves. These are ploughed down, and the mud is smoothed, first with the *noli*, and afterwards by the *mara*, which is a square log of timber yoked in the same manner. The field is then drained so that three inches of water only remain. In any of the three months between the vernal equinox and the summer solstice, the seed is sown broad-cast. As this is the dry season, the seedling plot must be very low, so as to receive a supply of water from some rivulet. On the fifth day after the seed has been sown, the whole water is allowed to drain from the plot; and for three days this is kept dry, after which it is constantly inundated, till the seedlings are fit for transplantation. The field into which they are to be removed is inundated during the two months following the summer solstice, and in the course of three days during that period ploughed four times. It is then manured, in the same manner as the plot was; and afterwards, in the course of two or three days, it is ploughed again three times. The mud is then smoothed with the *noli*, above mentioned; and the water having been let off to the depth of three inches, the seedlings are transplanted into the field, which must be always kept under water; and a month after it has been planted, the weeds must be removed by the hand. The harvest is in the month preceding the winter solstice.

All the fields are capable of both modes of cultivation. The transplanting is reckoned most troublesome and least productive, and requires most seed. A kandaga of land is an extent that in the transplanting cultivation requires one kandaga of seed; in dry-seed cultivation, it requires only fifteen kolagas. The produce of all the three kinds of rice is nearly the same, only the *heggai* gives rather most. Of this grain a kandaga of land of the first quality, cultivated by transplanting, produces eleven or twelve kandagas; land of the second quality produces eight kandagas; and land of the third quality produces six kandagas. The same ground, cultivated with dry-seed, would produce from half a kandaga to one kandaga more.

The kinds of rice cultivated at Shimoga are *sampige dala*, *beṭṭa kendāl*, *kembatti* and *sanabatti*, producing in a good crop ten, twelve and nine-fold respectively, the last two being equal. All these require six months to grow. They are all large-grained, except the *sanabatti*, which sells five per cent higher than the others. The lowest ground is used for the *sanabatti*, the highest for the *kembatti*.

The cultivation of all soils and all kinds of rice here is the same, and

the unprepared seed is sown by a drill. Immediately after harvest, the ground is once ploughed. When the rains commence during the two months following the vernal equinox, it is ploughed again twice, smoothed with the implement called *koradu*, and then hoed twice with the *heg kunte*, which is drawn by two oxen. This removes the grass; after which the clods are broken by drawing the *koradu* twice over the field, which in some measure serves as a rolling-stone. The dung is then spread; and after the first good rain the seed is sown with the drill or *kúrige*, and covered with the *koradu*. At this season the rain comes in showers, between which are considerable intervals. On the third day after having been sown, the field is hoed with the *heg kunte*, which here is called also *kambutige*. On the twentieth day, when the seedlings are nine inches high, the *koradu* is used again; then the *edde kunte*; then the *koradu*, and finally the harrow, which is made of a bunch of thorny bamboos. On the thirtieth day, more grass having sprung, the *edde kunte* is again used, the rows of young corn passing between the hoes; and this must be repeated as often as the grass springs. In the third month the water is confined, and then for the last time the *edde kunte* must be used. The mud raised by this is smoothed by the *koradu*; but in this operation the same implement is called *aravasi*. All these weedings are not sufficient, and the remaining grass must be removed by the hand and weeding-iron. The rice is cut with the straw, and for two days is allowed to lie loose on the field. It is then put in ricks, without having been bound in sheaves, and remains there until trodden, which may be done any time in the course of three months. It is always preserved in the husk, and when wanted for consumption is cleaned by a hand-mill of the usual form, but made entirely of timber, which removes the outer husk; but the inner one, or bran, must be separated by beating in a mortar. Eight measures of clean rice, as usual in India, are equal in value to twenty of that which retains the husk.

South of the Chitaldroog District, all the rice ground is cultivated as sprouted-seed. The seed is sown equally thick, yet in Budihal the land often produces sixty-fold, and the ordinary crop is forty seeds; while towards Garudagiri, the usual produce is twenty seeds. In the course of one year there are frequently from the same field two crops of rice.

The kinds of rice cultivated at Belur are *hasude*, *bola mallige*, *bili sanna batta*, *kérivanna* and *putta batta*, which ripen in eight months; and *chipiga*, *kesari*, *kumbara kesari*, *kempu sanna batta*, and *modara*, which ripen in seven months. On *niravari* land, or that which has a supply of water from tanks, the rices most commonly cultivated are

kirivanna and *hasude*. All the three kinds of cultivation are in use ; but in ordinary seasons the dry seed is by far the most prevalent. In extraordinary wet seasons a good deal is transplanted, and some is sown sprouted.

The cultivation of the dry-seed is conducted as follows :—In the month following the winter solstice, the ploughing commences, and in the course of two months the operation is eight times repeated. The little banks, inclosing the plots for confining the water, are then repaired, and the field is manured. In the month preceding the vernal equinox, after a shower of rain, the clods are smoothed with the *ada*, or *gidde mara*, which is the same implement which at Nagar is called *noli*. Eight days afterwards, the field is again ploughed and again smoothed with the *ada*. The seed is sown by the drill, according as the rainy season commences, during the two months and a half which follow the vernal equinox. It is then covered by the *ada*. On the twenty-third day after having been sown, the field is hoed with the *edde kunte*, and this is repeated twice, with an interval of four days between each time. The field is then inundated by confining the water, and the *kunte* is drawn a fourth time in the mud. On the day following, the soil is smoothed with the *ada*. Eight days afterwards, the field is drained until the weeds can be removed by the hand. After a month or six weeks, this must be repeated. The rice is cut with the straw, and trodden out by oxen.

When the rains are heavy, a good deal of rice is raised by transplantation. For every kandaga land, two kandagas of seed must be sown ; and the produce of this, on the best land, is only twenty-one or twenty-two kandagas. Very little sprouted-seed is sown ; but it seems to be the cultivation that would answer best. For a kandaga land fifteen kolagas of seed are sufficient, and the produce is little less than in the dry-seed. On the *makke* land, or that which depends entirely on rain for a supply of water, the seed is always sown without preparation, and managed exactly in the same manner as on the *niravari*. The produce on the best land is twenty-two kandagas, from thirty kolagas sown on a kandaga field.

Sugar-cane.—A considerable quantity of sugar-cane is cultivated near Seringapatam. It is of two kinds, *rastáli* and *paṭṭápaṭṭi*.¹ Both yield *bella*, or *jaggory* ; but the natives can extract sugar from the *paṭṭápaṭṭi* alone. The *jaggory* of the latter is also reckoned the best. The *rastáli* can be planted only in Chaitra ; the *paṭṭápaṭṭi* may also be planted in Srávana or Mágha. The crop of *rastáli* is over in a year ; that of

¹ *Rastáli* is the original sugar-cane of the country ; *paṭṭápaṭṭi* was introduced, it is said, from Arcot, in the time of Haidar, by Mustafa Ali Khan, a paymaster-general.

paṭṭāpaṭṭi requires fourteen months, but may be followed by a second crop, or, as is said in the West Indies, by a crop of *ratoons*, which require twelve months only to ripen. The *rastāli* will not survive for a second crop.

When the ground is to be cultivated for sugar-cane, it is watered three days, and then for the same length of time it is allowed to dry. During the next eight days it must be ploughed five times, and the clods must be beaten small with a kind of pick-axe, called *kol gudali*. The field must then be manured, and ploughed a sixth time. The ground now rests fifteen days; after which, in the course of one or two days, it must be ploughed twice, and then be allowed eight days more rest. It is afterwards ploughed a ninth time. These operations occupy forty-four days; six more are employed in planting the cane, which is done by the instrument called *yale gudali*. With this the field is divided into beds of about six cubits wide. These beds are separated by small trenches, which are about fourteen inches wide, and eight deep. In every alternate trench are dug small wells about two feet deep. The water from the canal flows through all the trenches, and, a quantity of it lodging in these wells, is taken out with pots for watering the plants by the hand. Across every bed, at the distance of a cubit, are dug five holes, about six inches in diameter and three in depth. In each of these are placed horizontally two cuttings of the cane, each containing three joints. These are covered slightly with earth, over which is laid some dung. When the cane is planted in Chaitra, the trenches must be filled with water from the tank, and every hole must be watered by pots. At the other seasons the trenches are full, it being the rainy weather; but, even then, for one month, the holes containing the canes must daily be watered by the hand. The earth in the holes is then stirred up with a stick, and a little dung is added. Next month the daily watering must be continued, and at the end of it the whole field must be dug up with the *yale gudali*; and round every cluster of young canes there must be formed by the hand a small cavity, into which a little dung is to be put. In the third month the canes must be watered every other day. At the end of the third month, if the canes have grown with luxuriance, the field must be dug over again with the *yale gudali*; but, if they are rather stunted, the watering must be continued all the fourth month, before they get the third weeding. At this time, the earth at the roots of the cane is heaped up into ridges, crossing the beds at right angles to the trenches. Afterwards, no water is given immediately to the plants; but for three days the trenches must be kept full. It is then let out for a week. If there be rain, there is no occasion for more watering; but, if it be dry weather, the trenches, for a month, must be

filled with water one day in the week. Then the weeding with the *yale gudali* must be repeated, and the earth must be smoothed with the hand, and placed carefully round the canes. The young shoots from each hole will be now ten or twelve in number; those which are sickly must be cut off; and the healthy, which are about a cubit long, must be tied up with a leaf of the plant into bundles of two or three, in order to prevent them from spreading too much. Should there be no rain, the trenches must once in fifteen days be filled with water, till the canes, having grown higher, again require to be tied together. In a month after the first tying they ought to be two cubits high. When the plants are eight months old they will have grown another cubit, and will require another tying. The farmer now begins to repair his apparatus for making jaggory: the *ále mane*, or boiling-house; the *gána*, or mill; the *kopparige*, or boiler; the *achchu*, or mould; the *kunu*, or cooler; the *gormane*, or ladle; and the *chibalu*, or skimmer. In the eleventh month he begins to cut the *rastáli*, and the crop must be finished within the year. The *paṭṭápaṭṭi* is ripe in twelve months, and two months may be allowed for cutting it.

If it be intended to keep the field of *paṭṭápaṭṭi* for a second year's crop, the dry leaves which are cut off at crop season must be burned on the spot, and the whole field must be dug with the *yale gudali*. The trenches must then be filled with water, and for six months the watering must be continued once in eight or ten days, unless there be rain. The weedings during this time ought to be three; at each of which dung ought to be given. At the end of six months, the canes having grown one cubit high, the weakly plants must be removed, and the strongest tied up, as in the first crop. The manner of conducting the two crops after this is quite similar. The canes of the second crop must be all cut within the year.

The kinds of sugar-cane cultivated in Kolar are four, which are esteemed in the following order: first *rastáli*, second *paṭṭápaṭṭi*, third *mara kabbu*, fourth *kaṭṭe kabbu*. The two last are very small, seldom exceeding the thickness of the little finger; yet the *kaṭṭe kabbu* is the one most commonly cultivated. This is owing to its requiring little water; for by means of the *yáta* it may have a supply sufficient to bring it to maturity. From the end of *Phálguna* to the end of *Chaitra* (Mar.—April) plough eight or ten times. Manure the field with dung, and plough it again. Then spread leaves on it, and cover them with the plough. By the small channels that are to convey the water, the field is then divided into beds eight cubits broad. Furrows are then drawn across the beds at the distance of nine inches from each other. The cuttings of cane, each containing four or five eyes, are then placed

lengthwise in the furrows, the end of the one touching that of the other. They are covered with a very little earth, over which is laid some dung. They are then watered, the water flowing through every channel, and entering every furrow. For one month the watering is repeated once in three days; the earth round the canes must then be loosened with the point of a sharp stick. For fifteen days more the watering must be continued; when the whole field should be hoed, and levelled with the *kól gudali*. Four days afterwards, between every second row of sugar-cane a trench is dug, and into this the water flows from the channels. Thus in the progress of its cultivation each bed assumes two forms. When there is no rain, the field requires to be watered once in fifteen days. When four or five months old, the canes are tied up in bundles; and when they are a cubit and a half high this is repeated. In eleven months they are ripe, and a month and a half are allowed for the crop season. The soil here used for sugar-cane is the rich black soil called *ere*; and after sugar it requires one or two years' rest before it gives a good crop of rice. The sugar-cane is all made into jaggory; seventy-four seers measure, or nearly eighteen ale-gallons of juice, are said to produce fifty kachcha seers weight (about $26\frac{1}{2}$ lb. avoirdupois) of the jaggory.

The sugar-cane field at Madgiri is divided into two equal portions, which are cultivated alternately, one year with sugar-cane, and the other with grain; the cane, however, thrives better when the field, in place of being cultivated for grain, is allowed an intermediate fallow; but then the loss is heavy, as after cane the grain thrives remarkably. The grains cultivated are rice, *rági*, and *jóla*; the first injures the cane least, and the *jóla* injures it most. The kinds of cane cultivated are the *rastáli* and *mara kabbu*. In Kártika and Márgasira (Oct.—Dec.) plough seven times, and manure with sheep's dung and leaves. Then with the hoe called *yale gudali* form channels at a cubit's distance. In these also, at a cubit's distance, plant single shoots of the cane, each about a cubit in length. If the soil be poor, they must be planted rather nearer. They are laid down in the channels, which are filled with water, and then people tread the shoots into the mud, by walking through each channel. A *kolaga* of land requires 18,000 shoots, on which data it ought to contain 1·8 acre. If the soil be of a moist nature, the cane has water once in eight days; but, if it dry quickly, it must, until ripe, be watered once in six days, except when there is rain. At the end of the first month the field must be hoed with the *kali kudali*. Near each cane, as a manure, some leaves of the *honge* are then placed, and they are covered with a little mud; so that the channels are now between the rows of cane, and the canes grow on the ridges. When these are $2\frac{1}{2}$

cubits high, they are tied up in bunches of three or four ; and as they grow higher, this is three or four times repeated. Twelve months after planting, the crop season begins ; and in six weeks it must be finished : 250 maunds of jaggory is here reckoned a good crop from a kolaga of land, which is very nearly 15 cwt. an acre ; 150 maunds, which is about 9 cwt. from the acre, is reckoned a bad crop. Black clay gives the greatest quantity of jaggory, but it is of a bad quality. A sandy soil produces least jaggory, but that of a high value. One *kapile* can water an acre and a half of sugar-cane land.

The ground for cultivating sugar-cane in Sira is also divided into two equal parts, which are alternately cultivated ; one year with cane, and the other with rice. It is watered either from the reservoirs, or by the *kapile*. In the last case, a field of two *kolagas*, or three acres, one-half of which is in sugar-cane, and the other in rice, requires the constant labour of four men and eight oxen. Day-labourers must also be hired to rebuild the boiling-house, to tie up the cane, and to weed. When the field is watered from a reservoir, one man only is regularly employed ; but to plough, to plant, to weed and to tie up the cane, both men and cattle must be hired in addition. Three kinds of cane are here cultivated. The most valued is the *rastáli*, which grows best on a black soil in which there is much sand or gravel ; a good crop of this, on a *kolaga* land, produces 100 maunds of jaggory ; which is about $29\frac{1}{2}$ cwt. on an acre. The next in quality is the *kari kabbu*, or black cane. It requires a pure black mould, called *ere bhúmi* ; and, in a good crop, produces, from a *kolaga* land, sixty maunds of jaggory, or from an acre nearly $17\frac{1}{2}$ cwt. The poorest cane is the *mara kabbu*, or stick cane. It is cultivated on the same kind of soil with the *rastáli* ; but produces only half as much jaggory as the *kari kabbu*, and that of a very bad quality, for it is quite black.

The cultivation of the *rastáli*, however, is comparatively much more troublesome. In the course of the eight months following the summer solstice, the field must be ploughed eleven times ; and once a month, during the whole of that time, 1,000 sheep must be folded for one night on the field. It is then manured with mud from the bottoms of the reservoirs, and ploughed again twice. The channels are then formed, and in them the cuttings are laid down, two and two being always placed parallel. A *kolaga* of land requires 50,000. The channels are then filled with water, and the cuttings are trodden into the mud with the feet. The second watering is on the fourth day, the third watering on the twelfth ; afterwards the field, if the soil be good, must be watered once a fortnight ; or once a week, if it part with its moisture quickly. On the twentieth day the field is weeded with the small hoe

called *molu potu*, which implies that the operation is done very superficially. On the thirty-fifth day the whole field is dug with the large hoe called *yale gudali*; and, the earth being thrown up toward the canes in ridges, the channels for conveying the water run between the rows. About the ninetieth day the canes are tied up with a leaf of the plant in parcels of five or six, and once a month this is repeated. When the cane is ten months old, the crop begins, and in thirty days it must be finished.

Towards Periyapatna, the cane is watered from reservoirs; the natural moisture of the climate not being sufficient to raise it, and machinery being never employed. The kinds cultivated, besides a little *paṭṭāpaṭṭi*, are *rastāli* and *mara kabbu*, both of which grow nearly to the same length, which is in general about six feet. The *rastāli* ripens in twelve months, while eighteen are required to bring forward the *mara kabbu*; so that as a crop of rice must always intervene between two crops of sugar-cane, the rotation of the former occupies two years, while in that of the latter three are consumed.

For the *mara kabbu* plough twenty times either in *Asvīja* and *Kārtika*, the two months immediately following the autumnal equinox; or in *Kārtika* and *Mārgasira*, which is of course one month later. The canes are planted in the second or third months after the winter solstice. In order to plant the cane, longitudinal and transverse furrows are drawn throughout the field, distant from each other one cubit and a half; at every intersection a hole is made, nine inches wide, and of the same depth; in each hole are laid horizontally two cuttings of cane, each containing three joints; finally under them is put a little dung, above them an inch of mould. Then water each hole with a pot, from a channel running at the upper end of the field. On the two following days this must be repeated. Until the end of the third month, water every other day. From the third to the sixth month, the field must, once in eight days, be ploughed between the rows of holes; and at the same time, should there be any want of the usual rain, it must be watered. At the first ploughing a little dung must be given, and at the end of six months the field must be copiously manured. At this time channels are formed winding through among the canes; so that every row is between two channels. When the rainy season is over, these channels must be filled with water, once in eight days in hot weather, and once a month when it is cool. At the beginning of the eighth month the whole field is hoed, and at the end of two months more this is repeated. The cane here is never tied up.

The sugar-cane cultivated in Nagar is the *mara kabbu*. The ground

fit for it is that which has a supply of water in the dry season. Any soil will do, but a red earth is reckoned the best. In the month preceding the vernal equinox plough four times; and then throughout the field, at the distance of one cubit and a half, form with the hoe trenches one cubit wide, and one span deep. Then cover the field with straw, dry grass, and leaves, and burn them to serve as a manure. The soil in the bottom of the trenches is afterwards loosened with a hoe; and a man, with his hand, opens up the loose earth, puts in a little dung, and upon this places horizontally, and parallel to the sides of the trench, cuttings of the cane, each containing four or five joints. These he covers with a little dung and earth. The cuttings are placed in one row in each bed, the end of the one being close to that of another. Once a day, for a month, the canes must be watered with a pot; the young plants are then about a cubit high; and, the earth round them having been previously loosened with a sharp-pointed stick, a little dung should be given to their roots. After this, the ridges are thrown down, and the earth is collected toward the rows of young cane, which by this means are placed on ridges, with a trench intervening between every two rows. Until the rains commence, these trenches must every other day be filled with water. In the month preceding the autumnal equinox, in order to prevent them from being eaten by the jackals and bandicoots, the canes are tied up in bundles of from five to ten, and each of these is surrounded by a series of straw rope. In ten months they are fit for cutting, and require no farther trouble. The crop season lasts one month. On the second year a crop of ratoons is taken, in the third year the roots are dug up, and the field is again planted with cane; so that it is never reinvigorated by a succession of crops.

Sugar-cane is at Harihar the most considerable irrigated crop. In the intervals between the crops of cane, a crop of rice is taken, should there be a sufficient supply of water; but that is seldom the case, and the intermediate crop is commonly some of the dry grains. The cane may be planted at any time; but there are only three seasons which are usually employed. One lasts during the month before and month after the summer solstice. This is the most productive and most usual season; but the cane requires at this time longer to grow, and more labour, than in the others. The other two seasons are the second month after the autumnal equinox, and the second month after the shortest day. Those crops arrive at maturity within the year.

The kind of cane cultivated is the *mara kabbu*, and the following is the process in the first season:—In the second month after the

vernal equinox, the field must be watered, and eight days afterwards it is ploughed once. After another rest of eight days, it must be ploughed again with a deeper furrow, four oxen having been put into the yoke. After another interval of eight days it is ploughed, first lengthwise, and then across, with a team of six oxen. Then, at the distance of three, or three and a half cubits, are drawn over the whole field, furrows which cross each other at right angles. In order to make these furrows wider, a stick is put across the iron of the plough. In the planting season, two cuttings of the cane, each containing two eyes, are laid down in every intersection of the furrows, and are covered slightly with mud. The furrows are then filled with water, and this is repeated three times, with an interval of eight days between every two waterings. A little dung is then put into the furrows; and when there happens to be no rain, the waterings once in the eight days are continued for three months. When the canes have been planted forty days, the weeds must be removed with a knife, and the intervals are hoed with the hoe drawn by oxen. This operation is repeated on the fifty-fifth, seventieth, and eighty-fifth days, and the earth is thrown up in ridges toward the canes. In the beginning of the fourth month, the field gets a full watering. Fifteen days afterwards, the intervals are ploughed lengthwise and across; and to each bunch of plants a basket or two of dung is given and ploughed in. The weeds are then destroyed by a hoe drawn by oxen; after which, channels must be formed between the rows; and until the cane ripens, which varies from fourteen to seventeen months, these channels are filled with water once in fifteen days. The crop season lasts from one month to six weeks.

Cardamoms—are propagated entirely by cuttings of the root, and spread in clumps exactly like the plantain-tree. In the month following the autumnal equinox, a cluster of from three to five stems, with the roots adhering, are separated from a bunch, and planted in the same row, one between every two areca-nut palms, in the spot from whence a plantain-tree has been removed. The ground around the cardamom is manured with *nelli* (*emblica*) leaves. In the third year, about the autumnal equinox, it produces fruit. The capsules are gathered as they ripen, and are dried four days on a mat, which during the day is supported by four sticks, and exposed to the sun, but at night is taken into the house. They are then fit for sale. Whenever the whole fruit has been removed, the plants are raised, and, all the superfluous stems and roots having been separated, they are set again; but care is taken never to set a plant in the spot from whence it was raised, a change in this respect being considered as necessary. Next

year these plants give no fruit, but in the year following yield capsules again, as at first. After transplantation, the old stems die and new ones spring from the roots. Each cluster produces from a quarter to one seer weight of cardamoms, or from $\frac{1}{10}^5$ to $\frac{1}{10}^6$ of a pound.

Areca-nut.—In the gardens near Channapatna the areca palm requires a rich black soil, and is planted in such places only as produce water on digging a well two cubits deep. There are here two varieties of the areca, the one bearing large and the other small nuts. The produce of both kinds is nearly equal in value and quantity.

The following is the manner of forming an areca-nut garden :—A plot of ground having been selected for a nursery, is dug to the depth of one cubit. When the seed is ripe, which happens between the middle of January and that of February, trenches must be formed in the nursery, a span broad and a cubit deep. The trenches are half filled up with sand, on the surface of which is placed a row of the ripe nuts. These are again covered with five inches of sand, and two inches of rich black mould, and watered once in three days for four months, at which time they are fit for being transplanted into the garden. The garden having been fenced with a hedge of *euphorbium tirucalli*, or *jatropha curcas*, is dug to the depth of a cubit at the same time with the nursery and planted with rows of plantain-trees at the distance of three cubits. When the young palms are fit for being transplanted the garden must be dug again to the former depth, and two young arecas must be set in one hole between every two plantain-trees. When there is no rain they must have water every third day. When the rainy season commences, a trench must be dug between every third row of trees ; that is to say, so as between every trench to form beds each of which contains two rows of the areca. These trenches serve to carry off superfluous water and to bring a supply from the reservoir when wanted. The garden must be dug twice a year to keep it clear of weeds. At the end of three years the original plantain-trees are removed, and a row is set in the middle of each bed and kept up ever afterwards in order to preserve a coolness at the roots of the areca. When the areca-trees are about five feet high, which requires about five years, they receive no more water than what is given to the plantain-trees, which in dry weather must be watered twice a month. *The tree when five years old begins to produce fruit, and lives from thirty to forty years.

Each tree pushes out three or four spadices which from the middle of August until that of November become fit for cutting at different intervals of twenty or thirty days, one after the other. When the nuts have been cut, the skin is removed with an iron knife, and a quantity

is put into a pot with some water, in which it must be boiled till the eyes be separated. The nut is then cut into three or four pieces and for three or four days dried on mats exposed to the sun, when it becomes fit for sale. The plantations are interspersed with cocoa-nut, lime, jack and other trees, which add to the shade and to the freshness of the soil. Under the trees are cultivated ginger, and various vegetables.

The situation that is reckoned most favourable for areca gardens in Madgiri is a black soil which contains calcareous nodules. It differs from that in which cotton is raised by having the limestone a cubit or two deep; whereas the cotton requires it to be at the surface. The gardens at this place are watered from reservoirs, from canals, and from wells by means of the *kapile*.

To make a new garden,—in Srávana, the fifth month after the vernal equinox, plough four times. Then with the hoe called *yale gudali* form the garden into beds six cubits wide. Between every two beds is a raised channel for bringing a supply of water; and in the centre of each bed is a deep channel to carry off what is superfluous. The beds are divided into plots ten or twelve cubits long. Then plant the whole with shoots of the betel vine, and for its support sow the seed of the *hálwána*, *agase* and *nugge*. Then surround the whole with a thick hedge, and once a day for three months water with a pot. Whenever weeds grow they must be removed; and at each time the betel vines must get some dung. Between every two rows of the vines, in the fourth month, is put a row of young plantain-trees. Once in four days afterwards, the water is given from the reservoir or well. In six months the vines must be tied up to the young trees. At the same time, for every *wokkala* land, 3,000 nuts of the areca must be planted near the roots of the vines. When they are three years old a thousand of them will be fit for use, and 800 are required to plant a *wokkala* land, or about an acre and a half. They are planted distant in every direction from each other five cubits. At the same time plant on the inside of the hedge some rows of cocoa-nut palms and orange, lime, mango, or jack trees. The 800 areca palms, at five cubits distance, would only occupy about an acre; but a considerable space is taken up by a walk, and by the rows of fruit-trees between them and the hedge.

In nine years from the first formation of the garden the betel vines and most of the trees that supported them are removed. A few of the *agase* and all the plantains are allowed to remain. In the twelfth year the areca palms begin to produce fruit. The remaining *agase* trees, and one-half of the plantains are then removed. After this the garden requires water only once in eight days when there is no rain; and the whole is dug over, and formed like rice-ground into proper squares

and channels for distributing the water. One year it is manured with dung ; in the second with the leaves of the *honge* and *koghi*, and in the third year with mud from the bottom of a reservoir. So long as the garden lasts this succession of manures should, if possible, be continued ; and when the palms attain their full growth, which is in the fourteenth year of the garden, the plantain-trees are entirely removed. For thirty years from its arriving at maturity the palm continues vigorous, and for fourteen years more gradually declines ; during which time a new garden ought to be formed, and then the old trees should be cut, and the ground cultivated with grain, till the second formed garden again begins to decay. In place of those that die, some poor farmers plant new trees, and thus constantly keep up a garden on the same spot ; but here this is looked upon as a bad practice.

The crop season lasts two months before, and one after, the autumnal equinox. The nut, after being peeled, is cut into seven or eight pieces, and put up in a heap. Then take one seer of the nut, one seer of *cut terra japonica*, and a hundred leaves of the *piper betel*, beat them together repeatedly with some water, and strain the juice thus obtained into a pot. Take twenty seers of the bark of the *kari jali* and boil it during a whole night in a large pot with forty seers of water. With this decoction mix the juice expressed from the former materials, and boil again. While it is boiling, put in the areca-nut, after it has been cut, until the pot be full. Immediately after, take it out with a ladle, and put in more, till the whole is boiled. In order to be dried, it must be three days exposed on mats to the sun, and is then fit for sale. Forty maunds of dried nut is here reckoned the common produce of a *kolaga* land, which is about $6\frac{1}{8}$ cwt. an acre, or for each tree about $1\frac{1}{8}$ lb.

Near Chiknayakanhalli the areca thrives best in the rich black mould called *ere*, or *krishna bhumi*. The natives here look upon it as a matter of indifference, whether or not, on digging a little depth, water may be found in the soil. All that is required is to have a proper supply of water either from the reservoir or by means of machinery.

In the second month after the winter solstice, the nut intended for seed is cut ; and, having been put in a heap, is for eight or ten days kept in the house. A seed-bed is then dug to the depth of a foot, and three inches of the mould is removed from the surface, which is then covered with a little dung. On this the nuts are placed with their eyes uppermost, and close to each other. They are then covered with an inch of mould, and for three months are watered every other day. The seedlings are then three or four inches high, and must be transplanted into a fresh bed that is prepared in the same manner : but in this they

are placed a cubit distant from each other. Here they grow for three years, receiving water once every other day ; and once a month they are cleaned from weeds and have a little dung.

One year after planting the seed, the ground that is intended for the garden must be dug to the depth of a cubit, and the soil exposed for two months. Young plantain-trees are then placed in it at sixteen cubits distance from each other, and it is surrounded by a screen of cocoa-nut palms, and of jack, lime, and orange-trees, which are defended by a hedge of the milk-bush. At the same time seeds of the *agase* are planted throughout the garden, at the distance of four cubits. When there is no rain the garden must once in fifteen days be watered by channels made for the purpose. In the second month after the summer solstice of the third year, the young arecás are fit for transplantation. Then throughout the garden, at the distance of sixteen cubits, and in the middle between every two plantain-trees, are formed pits, a cubit deep and a cubit wide. In each of these pits a young areca is put, and it must be carefully raised from the seed-bed with much earth adhering to its roots ; and, after it is placed, the pit must be filled with earth, and then receive a pot of water. The young arecas are then between two and three feet high, and have four or five branches. If there be water in the reservoir, an irrigation once a month is sufficient ; but the *kapile* must be used once in ten days, as the waterings given by it are but scanty. For three years afterwards the whole garden must be completely hoed twice annually. At the one hoeing, for every four arecas, it must have a bullock-load of dung ; and at the other hoeing, every tree must be allowed an ox-load of red soil. The mud of reservoirs is here thought to be very bad for an areca-nut garden. Ever afterwards the garden is hoed completely once a year only, and is then manured with dung and red earth. At the intermediate period of six months, it is hoed near the trees, and has a little dung. At the end of the first three years the *agase* trees are cut. The plantains are always reserved ; but, as the old stems are cut, which is always done in from twelve to eighteen months, the young shoots are conducted to a distance from where the parent was originally placed ; and when the garden is twenty years old, in these spots are planted other young arecas, to supply the places of the old ones when they decay. This second set are again supplanted by a third, growing where the first set did, and thus a constant succession is preserved. In a new garden the areca begins to bear fruit in nine years ; but fourteen or fifteen years are required to bring forward those which are planted among old trees. They continue to bear for sixty or seventy years ; but after having been twenty-five or thirty years in perfection they begin to decay.

There are annually two crops of areca-nut : one in the second month after the summer solstice, the other in the two months which precede the shortest day. The last crop is superior both in quantity and quality. The nut, on being cut, is skinned in the course of two days, and put into a large pot with as much water as will cover it two inches. It is then boiled for about three-quarters of an hour until a white scum rises. The largest are then cut into eight pieces, and the smallest into two, with the others in proportion to their size. During the four following days they are spread out in the sun to dry, and every night they are gathered in a heap. When the fruit has been allowed to approach too near to maturity, the nut loses its colour ; and a deceit is attempted by adding a little reddle to the water in which it is boiled. This frequently deceives the consumer, but never the experienced dealer ; and seems to be done purposely to enable him to defraud the unwary.

A garden of 1,000 trees, allowing eight cubits square for each tree, ought to contain rather more than $3\frac{1}{2}$ acres ; but a young garden, containing trees at sixteen cubits, will require $8\frac{1}{2}$ acres. The produce is reckoned from forty to sixty maunds. The areca-tree is never cut till its leaves have turned brown. Its stem has then acquired great hardness, and in building is very useful.

The following process is adopted in Periyapatna to make a new plantation of areca :—Take a piece of ground consisting of black mould or a substratum of limestone, with water at no greater depth than three cubits, and surround it with a hedge of the *euphorbium tirucalli*, and some rows of young cocoa-nut palms. Then, at the distance of twelve cubits, dig rows of pits, two cubits deep and one and a half in diameter. These pits are six cubits distant from the nearest in the same row. In the second month after the vernal equinox, set in these pits young plantain-trees, and give them water once ; after which, unless the weather be uncommonly dry, they require no more. Two months afterwards hoe the whole garden and form a channel in the middle between every two rows of plantain-trees. The channels are intended to carry off superfluous water, and are a cubit wide and two feet deep. In the month immediately following the winter solstice, hoe the whole garden a second time. In the following month, between every two rows of plantain-trees make two rows of holes, at six cubits distance and one cubit wide and deep. Fill each hole half up with fine mould ; and in this place two ripe nuts of the areca, six inches asunder. Once in two days for three months water each hole with a pot. The shoots come up in Vais'ákha, after which they get water once only in five days. The holes must be kept clear of the mud that

is brought in by the rain ; and for three years must, on this account, be daily inspected. In the month following the autumnal equinox give a little dung. Ever afterwards the whole garden must be hoed three times a year.

After they are three years old the areca palms must be watered every other day in hot weather ; when it is cool, once in every four or five days, and not at all in the rainy season. The waterings are performed by pouring a pot-full of water to the root of each plant. In the beginning of the seventh year the weakest plant is removed from each hole ; and at each digging, for three years more, every tree must receive manure. After this, for three years, the young palms have neither dung nor water. In the fourteenth year they begin to bear, and in the fifteenth come to perfection, and continue in vigour until their forty-fifth year, when they are cut down. The crop season lasts over Asvīja, Kārtika, and Mārgasira. A good tree gives 857, and an ordinary one 600, nuts. Sixty thousand nuts, when prepared for sale, make a load of between seven and eight maunds. One thousand ordinary trees at this rate should procure seventy-five maunds.

In Nagar the nursery is managed as follows :—In the month preceding the vernal equinox the seed is ripe. After having been cut, it is kept eight days in the house. In the meantime a bed of ground in a shady place is dug, and in this the nuts are placed nine inches from each other, and with their eyes uppermost. They must be covered with a finger-breadth of earth. The bed is then covered with dry plantain leaves, and once in eight days is sprinkled with water. In the month preceding the summer solstice, the plantain leaves are removed, and young shoots are found to have come from the nuts. In the second month afterwards, leaves of the *nelli* are spread between the young plants. In the month preceding the vernal equinox, they get a little dung. In the dry season they are watered once in from four to eight days, according to the nature of the soil.

In the month preceding the autumnal equinox of the second year, the young plants are removed into another nursery, where they are planted a cubit distant and manured with *nelli* leaves and dung. This nursery must be kept clear of weeds, manured twice a year, and in the dry season should receive water once in eight days. The seedlings remain in it two years, when they are fit for transplantation. When the arecas are three years old, they are removed into the garden, planted close to the drains for letting off the water, and remain there two years, when they are finally placed in the spots where they are to grow. Once in twenty or thirty years only the watering channels are filled up with fresh earth, and then are not allowed water. During that year the

garden is kept moist by occasionally filling the drains. The water in these is, however, reckoned very prejudicial, and is never thrown upon the beds. Once in two years the garden is dug near the trees and manured. The manure is dung, above which are placed the leafy twigs of all kinds of trees. When an areca dies, a new one is planted in its stead ; so that in an old garden there are trees of all ages. When the trees are sixteen years old they are employed to support pepper vines. The extent of a garden of a thousand rated trees is about $18\frac{1}{4}$ acres. Its produce of areca-nut weighs $920\frac{1}{2}$ lb., and of pepper 117 lb.

Cocoa-nut.—There are four varieties of the cocoa-nut : 1st, red ; 2nd, red mixed with green ; 3rd, light green ; and 4th, dark green. These varieties are permanent ; but, although the red is reckoned somewhat better than the others, they are commonly sold promiscuously. Their produce is nearly the same.

The soil does not answer in the Bangalore District unless water can be had on digging into it to the depth of three or four cubits ; and in such situations a light sandy soil is the best. The black clay called *ere* is the next best soil. The worst is the red clay called *kebbe* ; but with proper cultivation all the three soils answer tolerably well.

The manner of forming a new cocoa-nut garden is as follows :—The nuts intended for seed must be allowed to ripen until they fall from the tree ; and must then be dried in the open air for a month without having the husk removed. A plot for a nursery is then dug to the depth of two feet, and the soil is allowed to dry three days. On the *Ugádi* feast (in March) remove one foot of earth from the nursery, and cover the surface of the plot with eight inches of sand. On this place the nuts close to each other, with the end containing the eye uppermost. Cover them with three inches of sand and two of earth. If the supply of water be from a well, the plot must once a day be watered ; but, if a more copious supply can be had from a reservoir, one watering in the three days is sufficient. In three months the seedlings are fit for being transplanted. By this time the garden must have been enclosed and hoed to the depth of two feet. Holes are then dug for the reception of the seedlings, at twenty feet distance from each other in all directions ; for when planted nearer they do not thrive. The holes are two feet deep and a cubit wide. At the bottom is put sand seven inches deep, and on this is placed the nut with the young tree adhering to it. Sand is now put in until it rises two inches above the nut, and then the hole is filled with earth and a little dung. Every day for three years, except when it rains, the young trees must have water.

The cocoa-nut palm begins to produce when seven or eight years old, and lives so long that its period of duration cannot readily be ascertained. Young trees, however, produce more fruit, which comes forward at all seasons of the year. A good tree gives annually a hundred nuts. A few are cut green on account of the juice, which is used as drink ; but by far the greater part are allowed to arrive at some degree of maturity, although not to full ripeness ; for then the kernel would become useless.

Cocoa-nut palms are planted in Chiknayakanhalli in rows round the areca-nut gardens, and also separately in spots that would not answer for the cultivation of this article. The situation for these gardens must be rather low, but it is not necessary that it should be under a reservoir ; any place will answer in which water can be had by digging to the depth of two men's stature. The soil which is here reckoned most favourable for the cocoa-nut is a red clay mixed with sand. It must be free of lime and saline substances. Other soils, however, are employed, but black mould is reckoned very bad. The cocoa-nuts intended for seed are cut in the second month after the winter solstice. A square pit is then dug, which is sufficiently large to hold them, and is about a cubit in depth. In this, fifteen days after being cut, are placed the seed-nuts, with the eyes uppermost, and contiguous to each other ; and then earth is thrown in so as just to cover them, upon which is spread a little dung. In this bed, every second day for six months, the seed must be watered with a pot, and then the young palms are fit for being transplanted. Whenever, during the two months following the vernal equinox, an occasional shower gives an opportunity by softening the soil, the garden must be ploughed five times. All the next month it is allowed to rest. In the month following the summer solstice, the ground must again be ploughed twice ; and next month, at the distance of forty-eight cubits in every direction, there must be dug pits a cubit wide and as much deep. In the bottom of each a little dung is put ; and the young plants, having been previously well watered to loosen the soil, are taken up, and one is placed in each pit. The shell still adheres to the young palm, and the pit must be filled with earth so far as to cover the nut. Over this is put a little dung. For three months the young plants must be watered every other day ; afterwards every fourth day, until they are four years old, except when there is rain. Afterwards they require no water.

Every year the garden is cultivated for *rāgi*, *uddu*, *hesaru*, or whatever other grain the soil is fitted for, and is well dunged ; and at the same time four ox-loads of red mud are laid on the garden for every

tree that it contains, while a little fresh earth is gathered up toward the roots of the palms. The crop of grain is but poor, and injures the palms; it is always taken, however; as, in order to keep down the weeds, the ground must at any rate be ploughed; as the manure must be given; and as no rent is paid for the grain. On this kind of ground the cocoa-nut palm begins to bear in twelve or thirteen years, and continues in perfection about sixty years. It dies altogether after bearing for about a hundred years. They are always allowed to die; and when they begin to decay a young one is planted near the old one to supply its place.

In this country, wine is never extracted from this palm, for that operation destroys the fruit; and these, when ripe, are considered as the valuable part of the produce. A few green nuts are cut in the hot season, on account of the refreshing juice which they then contain, and to make *coir* rope: but this also is thought to injure the crop. The *coir* made from the ripe nuts is very bad, and their husks are commonly burned for fuel.

The crop begins in the second month after the summer solstice, and continues four months. A bunch is known to be ripe when a nut falls down, and it is then cut. Each palm produces from three to six bunches, which ripen successively. A middling palm produces from sixty to seventy nuts. As the nuts are gathered, they are collected in small huts, raised from the ground on posts. When a merchant offers, the rind is removed, at his expense, by a man who fixes an iron rod in the ground and forces its upper end, which is sharp, through the fibres; by which means the whole husk is speedily removed. He then, by a single blow with a crooked knife, breaks the shell without hurting the kernel, which is then fit for sale, and is called *kobbari*. A man can daily clean 1,300 nuts. From twenty to thirty per cent of them are found rotten.

Betel Vine.—The *betel vine* thrives best in low ground, where it can have a supply of water from a reservoir. If that cannot be had, a place is selected where water can be procured by digging to a small depth. A black soil is required. A betel-leaf garden is thus managed in the east:—In Chaitra or Vais'ákha, trench over the whole ground one cubit deep, and surround it with a mud wall; immediately within which plant a hedge of the *euphorbium tirucalli*, and of the *arundo tibialis*. When there is not plenty of rain, this must for six months be regularly watered. Then dig the garden, and form it into proper beds, leaving a space of about twenty feet between them and the hedge. From the main channel for conducting the water to the garden, draw others at right angles, and distant twenty-two cubits. Between every two of these, to

drain off the superfluous water, draw others about a cubit wide, and deeper than the former. The garden is thus divided into rows ten cubits in width, having on one side an elevated channel for supplying it with water, and on the other side a deep canal, to carry off what is superfluous. These rows are divided into beds, each also having on one side a channel to supply it with water, and on the other a canal to carry off what is superfluous; and it is surrounded by a narrow bank, about six inches high, which excludes the water that flows through the channels: within these little banks the divisions of the beds are carefully levelled.

In the centre of each division is then formed a row of small holes, distant from each other one cubit; and in Pushya (Dec.—Jan.) in every hole are put two cuttings of the betel-leaf vine, each two cubits long. The middle of each cutting is pushed down, and slightly covered with earth; while the four ends project and form an equal number of young plants, which for the first eighteen months are allowed to climb upon dry sticks that are put in for the purpose. For the first week after being planted, the shoots must be watered twice a day with pots; for another week once a day, and until the end of the second month once in three days. A small drill is then made across each division of the beds, and between every two holes in each; and in these drills are planted rows of the seeds of the *agase*, *nugge* and *varjēpu*. The young betel plants must then have some dung, and for four months more must be watered with the pot once in three days. Afterwards, so long as the garden lasts, all the channels must once in four days be filled with water. This keeps the ground sufficiently moist, and water applied immediately to the plants is injurious. The garden ought to be kept clean from weeds by the hand, and once a year, in December, must have dung.

When the plants are a year and a half old they are removed from the sticks; two cubits of each, next the root, is buried in the earth; and the remainder, conducted close to the root of one of the young trees, is allowed to support itself on the stem. At the end of two years two cubits more of each plant are buried in the ground; and ever afterwards this is once a year repeated. At the beginning of the fourth year the cultivator begins to gather the leaves for sale, and for six or seven years continues to obtain a constant supply. Afterwards the plants die, and a new garden must be formed in some other place. In order to give additional coolness to the garden, at its first formation a plantain-tree is put at each corner of every bed, and by means of suckers soon forms a cluster. So long as the garden lasts these clusters are preserved. At all times the gardens are very cool and

pleasant ; but they are not neatly kept ; and in the space between the hedge and the beds, a great variety of bushes and weeds are allowed to grow.

In the west, the betel vine is grown with the areca palm in the following manner :—When the areca plantation is fifteen years old, in the month immediately following the vernal equinox, a hole is dug near every tree, one cubit deep and one and a half in width. After having exposed the earth to the air for a month, return it into holes and allow it to remain for another month. Then take out a little of the earth, smooth the surface of the pit, and bury in it the ends of five cuttings of the betel-leaf vine, which are placed with their upper extremities sloping toward the palm. Once every two days, for a month, water the cuttings, and shade them with leaves. Then remove the leaves and with the point of a sharp stick loosen the earth in the holes. In the first year the waterings must be repeated every day, and the whole must once a month be hoed ; while at the same time dung is given to every plant. In the second year, the vines are tied up to the palms ; once in two months the garden is hoed and manured ; and it is in the hot season only that the plants are watered. At the end of the second year the vines begin to produce saleable leaves. In the third year and every other year afterwards, so much of the vines next the root as has no leaves, must be buried. Once in six months the garden must be hoed and manured ; and in the hot season the vines must be watered every other day.

The owners of these plantations are annoyed by elephants, monkeys and squirrels ; and, besides, both palms and vine are subject to diseases ; one of which, the *anibe*, in the course of two or three years kills the whole. Except when these causes of destruction occur, the vine continues always to flourish ; but the palm begins to decay at forty-five years of age, and is then removed, care being taken not to injure the vine. Near this is made a fresh hole, in which some persons place two nuts for seed, and others plant a young seedling. In order to support the vine during the fifteen years which are required to bring forward the new palm, a large branch of the *hárudána*, or *erythrina*, is stuck in the ground, and watered for two or three days ; when it strikes root and supplies the place of an areca.

Coffee.—The variety of coffee cultivated in Mysore appears to be the true *coffea arabica*, which Rhind informs us was originally introduced into Arabia from Abyssinia. It was introduced into this Province some two centuries ago by a person named Baba Budan, who,

¹ Adapted from a memorandum by Mr. Graham Anderson, C. I. E., Bargua Estate, Manjarabad.

on his return from a pilgrimage to Mecca, brought a few seeds, which he planted on the range of mountains still bearing his name.¹

In the selection of land for coffee cultivation, care must be taken to obtain a tract well sheltered by nature from undue exposure either to the south-west or the east wind, and situated, with a northern, north-eastern, or north-western aspect, within the zone that is favoured with as large as possible a share of the March and April showers and yet not visited by too large a share of rain in the south-west monsoon. There is in fact a line or coffee zone in every coffee-producing country, and more especially in Mysore, even a mile beyond which the coffee-tree will not exist. The plant rejoices in a damp, warm temperature, such as is procurable in the west of Mysore at elevations from 2,500 to 3,500 feet above sea-level, although the tree will grow under certain circumstances at elevations both below and above these. A good rich loamy soil, of any colour, with a good deposit of vegetable matter on the surface, and not much sheet rock underlying it, is required.

There are five descriptions of land in Mysore in which coffee has been planted²:—the forest termed *káns*; heavy ghat forest, termed *male*; village jungles, termed *uduve*; *kumri*, or land the original timber on which having been cut has been followed by a secondary growth of trees of a smaller type; and *kanave*, or lands covered with hard-wood trees and bamboos. Some of the finest estates have been formed on lands of the first and third classes, which have the decided advantage over all other descriptions, of possessing a rich deposit of decayed vegetable mould that has not been exposed to atmospheric influences, and hence contains an almost inexhaustible store of organic and inorganic constituents available as food for the coffee plant.

The *káns* are generally situated in mountainous country, intersected by streams of clear water, with rocky or sandy beds. The peculiarity of the ravines through which these streamlets flow is, that the undergrowth is entirely different from that found under similar circumstances in the ghat forests, consisting as it does of a gigantic species of

¹ Further particulars of the history of coffee cultivation will be found under Kadur and Hassan Districts in Vol. II.

² This description applies to the Malnád, where alone extensive coffee plantations have hitherto been formed. But forty years ago there were coffee gardens in Bangalore, and a few plants were grown in private gardens under wells by European residents since then, yielding sufficient for domestic wants. The same practice seems to have been common in Cochin so far back as 1743, according to Cantervisscher's "Letters from Malabar." Of late years an experiment on a larger scale has been made at Bangalore, by Mr. Minakshaiya, and coffee grown with great success on irrigated land. The consequence has been a demand by European planters for land suitable for the purpose near Bangalore and Mysore, and in other Maidán parts.

triangular coffee-weed (called in Canarese *hanal* or *heb-gúrkal*), and other succulent plants, whereas in the latter case basket reeds (termed *warti*) and canes (*betta*) of every description are generally found in a tangled mass. *Uduve* is strictly village jungle or forest, sometimes almost entirely surrounded by rice-fields. The trees are frequently large and of good descriptions, and the undergrowth is principally small coffee-weed, bamboos and thorns. There are fewer ravines in this kind of land and they are generally smaller and less precipitous, but frequently old excavations, termed *wanigalu*, are met with, which evidently were dug out as approaches to villages formerly situated in the very heart of the forest. *Male* tracts are situated close to the crest of the ghats and generally contain gigantic timber, but can seldom boast of good soil, except in protected situations, the generality of the land having suffered from wash caused by the almost incessant rainfall in the monsoon. The great height of the trees also proves prejudicial to coffee, which is cut to pieces by the drip. The situation being bleak, windy, and exposed to terrific rainfall, is seldom profitable for coffee cultivation. *Kumri* lands frequently contain magnificent-looking soil, but a certain amount of virtue has gone out of it by former exposure, and although coffee has been planted and fine estates made on such land, still the operation is always accompanied by a considerable amount of risk, and always by heavy extra expenditure. In *kanave* lands ravines containing fair average soil and trees are to be met with, and these places are the only portions suitable for coffee. This description of land has the disadvantage of showing a maximum area of holding with a minimum of space available for cultivation.

Clearing for a plantation consists of removing with the axe and cutting all undergrowth and obstructions, and such trees as are not required. Large trees that have a thick foliage in the hot weather and little or none in the monsoon, are left as shade at regular distances, attention being paid to leave fewer trees on portions with a northern aspect than on those facing the south, all quarters exposed to the wind especially requiring protection. This accomplished, the ground is either cleared by lopping and laying in line to await the process of rotting in the monsoon, or fire is used to facilitate matters. Lines of pegs, generally at 6 × 6 feet, are then laid down, and the land is holed, each hole being generally one foot wide by two feet deep. This is done to remove all obstacles to the roots of the young plants, and to make a nice loose bed for their reception. Roads are traced to and from convenient points in the property, and these are again intersected by paths to facilitate the general working of the estate.

For *nurseries*, convenient situations, with facilities for irrigation or

with river or tank frontage, are selected and entirely cleared of trees, the soil being dug to the depth of two feet or more, and every root and stone removed. This is then laid out into beds, generally about four feet wide, separated by paths, and the whole well drained and put in order with the same care as a flower garden. Manure is applied and the beds are then cut up into furrows, at six inches apart, into which the seeds are placed, about one inch apart. The whole bed is then covered up with dry leaves and watered by hand, care being taken to maintain a uniform state of moisture, which must not be excessive. The seed germinates in six weeks, and from the bean, which is raised on a slender green stem of about eight inches in height, burst forth two small oval leaves. These two-leaved seedlings are pricked out into beds at either 4×4 or 6×6 inches, and require from ten to fourteen months, with constant attention and watering, to form into good plants, which should have three or four pairs of small primary branches and be from one foot to one and a half in height.

Planting is performed in the months of June, July and August. The plants being carefully removed from the beds and the roots trimmed, they are planted either with a *mamoti* or planting staff by a regular gang of experienced men. Great attention is paid to this operation to see that the holes are properly filled in and that the roots are not bent or injured, and lastly that the plants are firmly set in the ground and not hung.

Under favourable circumstances, the plants are ready for *topping* in the second year. A topping staff, duly marked to the proper height, is placed alongside of the young tree, and the top or head and *one* primary branch are removed. Trees are topped at heights varying from two feet to four and a half feet, but the medium of three feet is generally preferred. This operation has the effect of directing the sap into the primary branches and making them throw out secondary shoots, which come from each eye along the branch. An abundance of vigour has the effect of forcing out a number of shoots under the junction of the upper primaries with the stem, and also from the stem at various places. These are termed suckers, and are all removed by gangs of women and boys. The first crop generally appears in the third year, and consists merely of a few berries on the primary branches, aggregating about one maund per acre. In the fourth year a return of about one cwt. per acre may be expected, and it is not until the seventh or eighth year that the planter is rewarded by a full crop, which, even under the most favourable circumstances, rarely exceeds five or six cwts. per acre.

The crop commences to ripen in October and November. As soon

as the cherries are of a fine red colour, they are picked into baskets, and brought to the pulper to be either measured or weighed, and deposited in a vat made for their reception. They are passed through the pulper with a stream of water either the same day or early next morning, and the pulp or outer skin being thus removed, the beans are allowed to ferment for twenty or twenty-four hours, without water, to facilitate the removal of the saccharine matter which surrounds them. After the mass has been washed and well stamped out in three waters, all light beans and skins being carefully separated, the beans are removed to the draining mats, where they are constantly turned over and allowed to remain for a day or more, or until all water has drained off. They are then spread out thickly on the drying ground in order to dry slowly. This is an operation requiring constant attention for six or eight days, the whole having to be covered up every evening to protect it from dews. The beans should not be dried too thinly spread, or too suddenly exposed to the full rays of the sun, as they are apt to become bleached and bent. A drying ground protected by large trees is the best, as in that case portions in shade and sun are both available. When the beans are sufficiently dried, they are bagged and despatched to the coast or Bangalore for preparation and shipment.

The yield of an estate that has been well maintained in cultivation may be put down at from three and a half to four cwts. per acre. As much as six cwts. per acre have been produced off portions, but of course only under the most favourable circumstances, and such is an exception to the general rule. An accurately calculated estimate shows that, in a series of years, the crop is more frequently below three and a half cwts. than above. But the result varies in different places.

The earliest official notice¹ of coffee in Mysore is said to have been in 1822. But though the plant has been known for so long, it is only of recent years that coffee has come into use among natives, and chiefly in the towns. When Mr. Elliot first settled in Mysore, in 1856, he was repeatedly asked by the farmers of the country whether Europeans ate the berry, or of what use it could possibly be. The variety of coffee originally cultivated here came to be known as Chick, probably from Chickmagalur, the principal town at the foot of the Baba Budan hills, the Mysore home of the plant. This variety had thriven well and promised to do so for an indefinite period of time, but in 1866 and the three succeeding years there were dry hot seasons, which caused a wide-spread attack of the Borer insect. About the same time a general

¹ The information in the following paragraphs is taken chiefly from *Gold, Sport and Coffee-planting in Mysore*, by Mr. R. H. Elliot, of Bartchinhulla Estate, Manjarabad.

decline in the constitution of the trees became manifest. So serious was the result that coffee-planting seemed likely to come to an end in Mysore, except in the case of a few elevated tracts in the Baba Budan hills. At this juncture, in 1870, Mr. Stanley Jupp, having observed advantages in the coffee grown in Coorg, recommended his brother planters to introduce seed from that province. The young plants raised from the imported seed thrived with extraordinary vigour, and it was soon found that the new variety would grow and crop well, and even on land on which all attempts to reproduce the Chick variety had utterly failed. "Then this sinking industry rose almost as suddenly as it had fallen; old and abandoned estates, and every available acre of forest and even scrub, were planted up; and land which used to change hands at from Rs. 5 to 10 an acre was eagerly bought in at twelve times these rates." Another cause for anxiety, however, now arose, for when the produce of the new variety came into the market, brokers objected to pay Mysore prices for Coorg coffee. But, as the trees from Coorg seed aged, the produce each year assimilated more and more in appearance and quality to that of the old Mysore plant. Consequently the Coorg variety, the stock of which is kept up by continual importations of fresh seed, has been permanently adopted as a plant which crops more regularly and heavily than the Chick, and the produce of which has so improved under the influence of the soil and climate of Mysore, that, with the exception of the long-established brand of "Cannon's Mysore," and the produce of a few other estates that still grow Chick, in the Baba Budan hills, there is little difference in value.

The high reputation of Mysore coffee, the best quality of which is commonly quoted at 10s. to 15s. a cwt. above that of any other kind that reaches the London market, is attributed partly to the soil and climate, and partly to the coffee being slowly ripened under shade. The pioneers of the industry, following the practice in Ceylon, had cleared away all the forest and planted their coffee in the open. That this was a fatal mistake was not at first decisively apparent. But the devastations of the Borer and leaf disease, the great enemies of coffee, eventually put the question beyond all doubt. And so clearly is the vital necessity of shade now recognized, that, in Mr. Elliot's opinion, formed after ample experience, "if good shade of the best kind is grown, it is absolutely impossible to destroy a plantation in Mysore, even with the worst conceivable management or neglect." The easiest of the methods that have been adopted for providing shade is to clear down and burn the entire forest and then plant shade trees along with the coffee. Another plan is to clear and burn the underwood and a certain portion of the forest trees, leaving the remainder for shade.

Experience shows that the retention of as much as possible of the original forest is desirable, and that land which has not been burnt will last far longer. To this may be attributed the continued existence of the most ancient estates in Mysore.

Five trees are specially recommended as the most suitable to grow for shade, namely, *kap basari* (*ficus tjakela*, Burm.)¹, *góni* (*ficus mysorensis*, Heyne), *kari basari* (*ficus infectoria*, Roxb.), *ili basari* (a variety of the same), and *mitli* (? *strobilus asper*, Lour.), of which there are two kinds, *heb mitli* and *haralu mitli*, the second being "a bad tree." The trees should be planted in lines running east and west, in order to provide shade from the southerly sun, and so close in each row that in five or six years the tops will touch. When they begin to crowd, every other one should be removed, and this process can be repeated if found necessary.

Of the diseases to which the coffee plant is subject in Mysore, *leaf disease* is the growth of a fungoid named *hemileia vastatrix*, which distributes its spores in the form of yellow powder. The effect is to strip the tree more or less of its foliage. The disease called *borer* is due to a beetle (*xylotrechus quadripes*), red or yellow with black lines, and about as large as a horsefly. It lays its eggs in some crevice in the bark. The larvæ, when hatched, bore into the stem and live on the heartwood for from three to five months, when they eat their way out as winged beetles. Coffee-trees attacked by borer wither away throughout the part the insect has injured. The best remedy for and preventive of both diseases is said to be properly shading the coffee with suitable trees. Another disease of coffee is called *rot*, also the growth of a fungoid, named *pellicularia koleroga*, which covers the leaves and berries with a black slime, causing them to rot away. The free circulation of air seems to be required when this appears.

With the view of ascertaining whether coffee grown from seed imported from other countries would be less susceptible to leaf disease, Messrs. Matheson and Co. went to great expense in Coorg in introducing coffee seed from Brazil, Venezuela, Costa Rica, and Jamaica. But it was found that in that respect they were neither better nor worse than the Coorg variety. A further experiment has been made with Blue Mountain seed, but the plants do not seem to be in any way different.

Liberian coffee (*coffea liberica*), a taller and stronger plant, with a larger leaf and berry, was introduced by Colonel Benson, Assistant

¹ Mr. Elliot gives this as Cub Busru (*Ficus tuberculata*), and no botanical name for the last two. My names are taken from Mr. Cameron's catalogue on the assumption that they represent the trees intended.

Commissary-General, about the time when leaf disease was causing such destruction. It was thought that this hardier plant, native of a hotter climate and lower region, might be found proof against the disease. But, notwithstanding various experiments, whether the flavour of the berry is inferior, or from whatever cause, it has not supplanted the old variety.¹ A hybrid, a cross between the two, is said to be more promising.²

Among *plants of economic value* introduced into the country in recent years, the following are deserving of mention :—

Casuarina.—None has been more successful or more extensively cultivated, principally as a fuel tree, than *Casuarina equisetifolia*, called by the natives *késarika*. It is an Australian tree, the swamp oak of Queensland, but better known as the Tinian pine or beefwood tree. The numerous and extensive plantations formed of it, especially in the Bangalore District, have visibly altered the landscape in some parts. As fuel it develops more heat in a given quantity than any other kind of local wood ; in fact, for locomotive and domestic purposes it is found necessary to use inferior fuel with it, in order to moderate the intense heat, which would otherwise prove destructive to engines and utensils. In experiments on the Mysore State Railway it was reckoned that casuarina logs ran a train over a distance thirteen per cent. in excess of that attained by the next best kind of fuel available in the Mysore forests.

Cinchona.—Two plantations were originally formed ; one in 1866 at Kalhatti on the Baba Budan hills (Kadur District), with 5,000 plants, and the other in 1867 on the Biligiri Rangan hills in Yelandur (Mysore District), with 2,000 plants. The only kind permanently cultivated was *C. succirubra* ; the more valuable but less hardy species of *C. calisaya* and *C. officinalis* were also tried, but without success. The number of trees in the first plantation had increased to 24,000, and a number had been distributed to favourable localities in the western Districts, when in 1871 the bark of trees from both plantations was submitted to analysis by Mr. Broughton, Quinologist to the Madras

¹ Mr. Cameron says :—“ When first introduced, the Liberian species had the reputation of being tropical in its requirements, and that its cultivation would extend to the plains of India. Experience has not proved this capacity, although, no doubt, when under shade, the plant can endure a considerably higher degree of temperature than the Arabian shrub. But under full exposure to the sun the former died outright, while the established species grew vigorously and produced good crops of coffee.”

* The following grafts have been established at the Lal Bagh for experiment :—Liberian on Arabian stock, Arabian on Liberian stock, Maragopipe on Arabian stock, Liberian on itself, Arabian on itself.

Government. The results obtained by him were reported as follows :—

Site of Plantation.	Yield in percentages of dry bark.				
	Total Alkaloids.	Quinine.	Chinchonidine and chinchonine.	Pure sulphate of quinine obtained crystallized.	Other sulphates of quinine.
Baba Budans { trunk ...	4.50	.86	3.64	.67	2.35
{ branch..	1.48	.42	1.06	.30	.60
Biligiri Rangans ...	7.50	2.01	5.49	1.09	4.84

The above analyses showed that, while as a source of alkaloids the bark of the Baba Budan plantation was of satisfactory quality, it was inferior in yield of total alkaloids to the bark from trees of the same age on the Nilgiris, namely, branch bark 2.28 per cent., trunk bark 6.49 per cent. "But though the amount of alkaloids is thus less," Mr. Broughton observed, "than is usual with good India grown bark, it fully equals the yield of ordinary red bark from South America." The bark from the Biligiri Rangan plantation was pronounced of high quality for *C. succirubra* and quite equal to that grown on the Nilgiris.

In consequence of this report the intention of extending the Baba Budan plantation was abandoned, but private planters, occupying more suitable sites, were encouraged to grow cinchona. Meanwhile the febrifuges obtained from the plantations were distributed to the local hospitals, and in 1875 the gardener in charge was sent to Ootacamund for instruction in collecting bark by the coppicing and the barking and mossaing processes. Eventually, in 1877, the Biligiri Rangan plantation was made over to the Jagirdar of Yelandur, in whose estate it was situated, on his paying to Government half the produce of bark yielded for five years; and in 1881 the Baba Budan plantation was sold to Mr. Sylk, a private planter, for Rs. 5,000.

The existing depression of the quinine trade holds out at present, it is understood, little prospect of profit on the cultivation; but the importance and medicinal value of the products of cinchona are never likely to diminish, and prices may again rise, though probably not to former rates. Special arrangements are being made, in common with other Indian Governments, for the manufacture and cheap distribution of quinine to all classes (for the latter purpose using the agency of the village post offices), a boon which should be highly appreciated in the malarious and fever-stricken parts of the country.

VANILLA

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Cinchona cultivation has since 1881 been entirely in private hands, and the following are the statistics for 1893-4, the plants being mostly scattered, in the midst of coffee or cardamom estates :—

Species.	District.	No. of acres.	No. of plants.	
			Mature.	Immature.
C. succirubra (red bark) ...	Mysore ...	24	8,860	12,873
	Kadur ...	224	124,255	43,450
	Total ...	248	133,115	56,323
C. officinalis, var. <i>condaminea</i> (Loxa or crown bark ; pale bark) ...	Mysore ...	1	75	1,141
	Hassan ...	36	8,000	5,003
	Kadur ...	34	14,464	...
	Total ...	71	22,539	6,144

Vanilla.¹—In a climate like that of Bangalore there is no difficulty whatever in cultivating the *vanilla aromatica*, as it grows luxuriantly without artificial assistance, provided that a suitable position is selected for the plantation. The least expensive and perhaps the most favourable site which can be selected for the purpose is an *old* mango tope, because the mango-trees in that stage are not too dense in foliage, and are better adapted to produce the checkered shade so essential to the healthy development of the vanilla plants. Like all succulents, this plant detests excessive moisture ; swampy situations should therefore be avoided. A light vegetable soil intermixed with sand is an agreeable compost, and cocoa-nut fibre is perhaps the best manure that can be applied. Ordinary-sized cuttings generally produce flowers three years after they are rooted, but large cuttings consisting of four or more nodes will produce flowers two years after they are rooted. The vanilla should be planted round the base of the mango-trees, small beds of the soil recommended having been previously prepared, and as the plants grow they should be trained round the stem and along the principal limbs of the trees for their future support,

In South America an indigenous insect fertilizes the vanilla flowers

¹ From notes by Mr. Cameron, Superintendent of the Lal Bagh.

accidentally, and thus secures the fruit, but in this country no such insect has yet made its appearance. We must therefore adopt our own means to fecundate the flowers. The process is simple when once acquired. The organs of reproduction (unlike the ordinary state of things) are disposed in a peculiar form, as if to prevent natural fecundation, and until this takes place by artifice, or chance as explained, the beans which comprise the economic product of vanilla will not be obtained.

Cocoa.—The chocolate-nut tree, *theobroma cocoa*, is indigenous to South America and the W. Indies, where it has been cultivated for various uses for many generations. The tree is an evergreen, which grows from sixteen to twenty-five feet high. The leaves are entire, smooth, and very glossy in appearance; the flowers, which are diminutive, are borne on the stem and principal limbs of the tree; hence the rare and curious appearance which the capsules present suspended from the bare stem. The trees in the Government Gardens have produced fruit freely. The peculiarities of the cultivation consist in the application of dense shade, moderate moisture, and decomposed vegetable soil, chiefly. Salt is also an indispensable ingredient in a compost for chocolate trees.

Rhea.—The Rhea plant or China grass of commerce is the *boehmeria nivea*. The fibre produced from the bark of this plant is very strong and delicate, but the difficulty of preparing it by machinery continues to obstruct its utility on an extensive scale. There are three species of *boehmeria* in the Lal. Bagh, and the climate of Mysore seems to facilitate their growth. The young shoots which produce the fibre grow more regular and free under half shade than when fully exposed to the sun's rays. The species *nivea* is quite established here, but never produces seed. It possesses the great advantage, however, that it can be helped by man; so that its naturalization in most parts of India is almost certain.

The following are other plants whose experimental cultivation has been more or less successful, some of them being permanently established:—

Acrocarpus fraxinifolius	Shingle-tree	Brassica chinensis...	Shantung cabbage
Agave rigida ...	Sisal hemp	Broussonettia papyrifera	Paper mulberry tree
Artiplex nummularia	Salt bush	Bursaria spinosa ...	Ornamental tree
Artocarpus cannoni	Copper-coloured foliage	Cæsalpinia coriaria	Divi-divi tree
Artocarpus incisa ...	Seedless bread fruit	Carissa edulis ...	(Edible berry)
Bambusa vulgaris ...	Golden bamboo	Castanospermum australe	Moreton - bay chestnut
Barringtonia speciosa	Ornamental tree	Castilloa elastica ...	Central American rubber

<i>Ceratonia siliqua</i> ...	Carob-bean tree	<i>Manihot glaziovii</i> ...	Ceara-rubber tree
<i>Clausena wampi</i> ...	Wampi (fruit)	<i>Mentha viridis</i> ...	Spearmint
<i>Cola acuminata</i> ¹ ...	Kola nut	<i>Millingtonia portensia</i>	Indian cork tree
<i>Colvillea racemosa</i>	Ornamental tree	<i>Monstera deliciosa</i>	Climbing aroid
<i>Couroupita guianensis</i>	Cannon-ball tree	<i>Opuntia ficus indica</i>	Malta prickly-pear
<i>Crescentia alata</i> ...	Calabash tree	<i>Panicum sarmentosum</i>	Mauritius grass
<i>Cyphomandra betacea</i>	Tree tomato	<i>Paritium elatum</i> ...	Cuba bast
<i>Dipsacus fullonum</i>	Fullers' teazel	<i>Parmentiera cerifera</i>	Candle tree
<i>Erythroxylon coca</i>	Yields cocaine	<i>Phoenix dactylifera</i>	Date-palm
<i>Euchlæna luxurians</i>	Buffalo grass	<i>Pithecolobium saman</i>	Rain tree
<i>Fagopyrum esculentum</i>	Buckwheat	<i>Poinciana regia</i> ...	Gold-mohur tree
<i>Grevillea robusta</i> ...	Silver oak	<i>Rubia tinctorum</i> ² ...	Madder plant
<i>Gynocardia odorata</i>	Yields chaulmugra oil	<i>Rubus idæus</i> ...	Raspberry
<i>Hyoscyamus niger</i>	Henbane	<i>Smilax sarsaparilla</i>	Yields sarsaparilla
<i>Lagunaria patersonii</i>	Foliage tree	<i>Stillingia sebifera</i> ...	Chinese tallow tree
<i>Landolphia kirkii</i> ...	Yields caoutchouc	<i>Trapa bispinosa</i> ...	Zinghara nut, water chestnut
<i>Landolphia watsoni</i>	Yields caoutchouc	<i>Tristania conferta</i> ...	Timber tree
<i>Malachea capitata</i>	Yields fibre	<i>Vangueria edulis</i> ...	Fruit tree
		<i>Vitis martini</i> ...	Cochin-China vine

Experiments have also been made with several varieties of cotton and potatoes. Varieties of cocoa-nut have been imported from Colombo in Ceylon; also trial has been made of various kinds of grape vines, loquat and bhere fruit (*Zizyphus jujuba*).

It may be useful here to give the following list of plants whose cultivation has been attempted without any permanent success at Bangalore:—

<i>Acacia decurrens</i> ...	Black wattle	<i>Durio zibethinus</i> ...	Durian
<i>Arracacia esculenta</i>	Arracacha	<i>Eucalyptus globulus</i> ³	Blue gum
<i>Avena elatior</i> ...	Common oat	<i>Garcinia mangostana</i> ⁴	Mangosteen
<i>Camellia theifera</i> ...	Tea plant	<i>Glycine hispida</i> ...	Soy bean
<i>Caryophyllus aromaticus</i>	Clove tree	<i>Helianthus annuus</i>	Russian sunflower
<i>Cassia obovata</i> ...	Tinnevely senna	<i>Humulus lupulus</i> ...	Hop vine
<i>Castania vulgaris</i> ...	Spanish chestnut	<i>Myristica fragrans</i>	Nutmeg tree
<i>Catalpa speciosa</i> ...	Californian timber tree	<i>Platanus orientalis</i>	Oriental plane
<i>Cephaelis ipecacuanha</i>	Ipecacuanha	<i>Symphytum aspernum</i>	Prickly comfrey
<i>Cyperus esculentus</i>	Ground almond, rush-nut	<i>Ullucus tuberosus</i>	Tuber
<i>Cyperus pangorei</i> ...	Sedge	<i>Withaviva (Puneeria) coagulans</i>	Cheese-maker

¹ Botanically not far removed from the indigenous *kendale mara* (*sterculia urens*).

² The plant which yields Indian madder has been found wild in Kankanhalli and other parts.

³ *Eucalyptus saligna*, *rostrata*, *marginata* and *citriodora* are established in the gardens and furnish seed.

⁴ Grafting it on the gamboge tree (*Garcinia morella*) seems to have been successful in Jamaica.

FAUNA

FERÆ NATURÆ

Nothing less than a separate treatise, and that a voluminous one, could do justice to the marvellous wealth of the animal kingdom in a province under the tropics marked by so many varied natural features as Mysore. An attempt has been made to present a list of the main representatives, with the Kannaḍa names, where they could be ascertained. A few notes on the localities frequented by particular animals will be found in Vol. II.

Mammals—Mammalia.¹

Primates.

Cercopithecida—Monkeys—*Kōti*.

Macacus silenus	... Singalika, karkōḍaga	... The lion-tailed monkey
Macacus sinicus	... Kōti, manga, kōḍaga	... The common monkey of the country
Semnopithecus entellus	Musu, musuva, musuku ² ...	The langur, or Hanuman monkey
Semnopithecus priamus	Konḍa-musuku, konḍa-mosava	The Madras langur
Semnopithecus johni...	The Nilgiri langur

Lemurida—Lemurs.

Loris gracilis	... Nala, aḍavi manushya	... The slender loris
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Carnivora.

Felida—Cat tribe—*Bekku*.

Felis tigris	... Huli, heb-huli	... The tiger ³
Felis pardus	... Kiraba, ibbandi, doḍ-ibba	The leopard or panther, ⁴ commonly called cheeta
Felis bengalensis	... Huli bekku, bottina bekku	The leopard cat
Felis chaus	... Kāḍu bekku	... The wild or jungle cat
Cynælurus jubata	... Chirite, sivangi, chircha	... The hunting leopard, the proper cheeta

¹ The classification and names are taken from W. T. Blanford's work on the *Fauna of British India*, and the vernacular names have been revised.

² It seems doubtful if this monkey is found in the South, and the names may belong to *S. priamus*.

³ There are said to be two varieties,—the *heb-huli*, or large royal tiger, found in the large jungle; and the *huli*, which is much smaller and is more destructive to human life, frequenting inhabited parts of the country. It has the black stripes closer together over the hind quarters.

⁴ The black variety is occasionally met with.

Viverridae—Civets.

<i>Viverricula malaccensis</i>	Punagina bekku, javádi bekku	The civet cat
<i>Paradoxurus niger</i> ...	Kira bekku, kabbu bekku	The tree cat or toddy cat
<i>Herpestes mungo</i> ...	Munguli, mungasi, kira	The mungoose
<i>Herpestes smithi</i> ...	... ..	The ruddy mungoose

Hyenidae—Hyenas—*Kirabu*.

<i>Hyæna striata</i> ...	Kirabu, katte kiraba	The striped hyæna
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Canidae—Dog tribe—*Náyi*.

<i>Canis pallipes</i> ...	Tóla	The Indian wolf
<i>Canis aureus</i> ...	Nari, ballu, guḷla nari	The jackal
<i>Cyon deccanensis</i> ...	Sil náyi	The Indian wild dog
<i>Vulpes bengalensis</i> ...	Kempu nari, channangi nari	The Indian fox

Mustelidae—Weasels.

<i>Mellivora indica</i> ...	...	The Indian ratel
<i>Lutra vulgaris</i> ...	Nir-náyi	The common otter

Ursidae—Bears—*Karāḍi*.

<i>Melursus ursinus</i> ...	Karāḍi	The Indian bear
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Insectivora.*Soricidae*—Shrews—*Sunḍ ili*.¹

<i>Crocidura cærulea</i> ...	Sunḍ ili, sonḍ ili	The musk rat or shrew
<i>Crocidura perroteti</i> ...	Múg-ili	Pigmy rat or shrew

Chiroptera.*Pteropodidae*—Frugivorous bats—*Bával*.

<i>Pteropis edwardsi</i> ...	Togal bávali, toval tóle hakki	The Indian fruit bat or flying fox
<i>Cynopterus marginatus</i> ...	...	The short-nosed fruit bat

Rhinolophidae—Insectivorous bats—*Kan-kappate*.

<i>Rhinolophus luctus</i> ...	...	The great horse-shoe bat
<i>Rhinolophus affinis</i> ...	...	The allied horse-shoe bat
<i>Hipposiderus speoris</i> ...	...	Schneider's leaf-nosed bat
<i>Hipposiderus bicolor</i>	The bicoloured leaf-nosed bat

Nycteridae.

<i>Megaderma lyra</i>	The Indian vampire bat
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Vespertilionidae.

<i>Vesperugo mordax</i>	The grizzled bat
<i>Vesperugo circumdatus</i>	The black bat
<i>Vesperugo abramus</i> ...	gabbiláyi	The Indian pipistrelle
<i>Vesperugo kuhli</i> ...	...	The white-bordered bat
<i>Nyctcegeus dormeri</i> ...	...	Dormer's bat
<i>Nyctcegeus kuhli</i> ...	...	The common yellow bat

Emballonuridae.

<i>Taphozous melanopogon</i> ...	...	The black-bearded sheath-tailed bat
<i>Taphozous longimanus</i> ...	...	The long-armed sheath-tailed bat
<i>Taphozous saccolæncus</i> ...	...	The pouch-bearing sheath-tailed bat

¹ Properly *sunḍil ili*.

Rodentia.*Sciurida*—Squirrels—*Uđute*.

<i>Pteromys oral</i>...	...	Háruva bekku	...	...	The brown flying squirrel
<i>Sciurus indicus</i>	...	Kes - aļilu, kemp - aļilu, kend-aļilu	...	...	The large Indian squirrel
<i>Sciurus macrurus</i>	...	...	...	...	The grizzled Indian squirrel
<i>Sciurus palmarum</i>	...	Alilu, aņilu, uđute	...	...	The common striped squirrel
<i>Sciurus tristriatus</i>	...	Káđ-aļilu...	...	...	The jungle striped squirrel

Murida—Rats and mice—*Ili*.

<i>Gerbillus indicus</i>	...	Bila ili	...	...	The Indian gerbille, or ante-lope rat
<i>Mus rattus</i>	...	Ili	...	...	The common Indian rat
<i>Mus decumanus</i>	...	Kemp ili...	...	...	The brown rat
<i>Mus musculus</i>...	...	Chiřt ili	...	...	The common house-mouse
<i>Mus buduga</i>	...	Bail ili	...	...	The Indian field-mouse
<i>Mus platythrix</i>	...	Kal ili	...	...	The brown spiny mouse
<i>Mus mettada</i>	...	Tóđa	...	...	The soft-furred field-rat
<i>Nesocia bengalensis</i>	...	Bail ili	...	...	The Indian mole-rat
<i>Nesocia bandicota</i>	...	Heggana...	...	...	The bandicoot rat
<i>Golunda eliotti</i>	...	Golandi	...	...	The Indian bush - rat (the coffee-rat)

Hystriacida—Porcupines—*Muļ-handi*.

<i>Hystrix leucura</i>	...	Muļ-handi, edu, eyya	The porcupine
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Leporida—Hares—*Moļa*.

<i>Lepus nigrocollis</i>	...	Moļa	The black-naped hare
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Ungulata.*Elephantida*—Elephants—*A'ne*.

<i>Elephas maximus</i>	...	A'ne	The Indian elephant
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Bovida—Ox tribe—*Yettu, basava*.

<i>Bos gaurus</i>	...	Káđ kópa, káte	The bison, or gaur
<i>Hemitragus hylocrius</i> ¹	...	Káđ áđu	The Nilgiri wild goat (ibex)
<i>Boselaphus tragocamelus</i>	...	Káđ kudure	...	...	The nilgai, or blue bull

Antelopida—Antelopes—*Chigari*.

<i>Tetraceros quadricornis</i>	...	Konđa-guri	...	...	The four-horned antelope
<i>Antilope cervicapra</i>	...	Chigari, hulle	...	...	The Indian antelope, or black buck
<i>Gazella bennetti</i>	...	S'ank hulle	...	...	The Indian gazelle, or ravine deer

Cervida—Deer tribe—*Jinke*.

<i>Cervulus muntjac</i>	...	Káđ-kuri	...	...	The barking deer, or jungle sheep
<i>Cervus unicolor</i>	...	Kađave, kađa	...	...	The sámbar deer
<i>Cervus axis</i>	...	Sáraga, duppi	...	...	The spotted deer
<i>Tragulus meminna</i>	...	Kur-pandi	The Indian mouse-deer

Suida—Hogs—*Handi*.

<i>Sus cristatus</i>	...	Káđ handi	The Indian wild boar
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Edentata.*Manida*—Ant-eaters.

<i>Manis pentadactyla</i>	...	Chip handi	The Indian pangolin.
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¹ There is some doubt whether ibex and nilgai are actually found in Mysore, but they are met with on the borders.

The most destructive to life are tigers, and panthers or cheetas. The following figures for the years 1890 to 1892 show the extent of loss, and what has been done to counteract the ravages of the larger animals, so far as the matter has come under official notice.

In 1889-90, there were four persons killed by tigers, two by panthers, and six by other animals; while of cattle, 1,150 were killed by tigers, 2,246 by panthers, 7 by bears, 2,695 by wolves, 362 by hyænas, and 225 by other animals.

In 1890-1, there were one person killed by an elephant, two by tigers, one by a bear, and four by other animals; of cattle, tigers killed 1,263, panthers 2,554, bears 49, wolves 1,823, hyænas 109, and other animals 289.

In 1891-2, there were one person killed by an elephant, one by a panther, three by hyænas, and nine by other animals; of cattle, 2,055 were killed by tigers, 3,621 by panthers, 2,439 by wolves, 242 by hyænas, and 375 by other animals.

The regular rewards offered for the destruction of wild beasts are Rs. 40 for a tiger or panther, and up to Rs. 10 for a hyæna. Elephants are too valuable to be destroyed, but a special reward is sometimes offered for the destruction of a rogue elephant that has become dangerous to life.

The amounts paid in rewards in the above years were as follows:—

Rs. 3,728 in 1889-90, namely, Rs. 1,416 for 40 tigers, Rs. 2,164 for 124 panthers, Rs. 12 for 4 hyænas, and Rs. 136 for 587 other animals.

Rs. 3,573 in 1890-1, namely, Rs. 1,453 for 39 tigers, Rs. 1,946 for 115 panthers, Rs. 18 for 4 hyænas, and Rs. 156 for 700 other animals.

Rs. 4,194 in 1891-2, namely, Rs. 100 for 1 elephant, Rs. 1,528 for 48 tigers, Rs. 2,303 for 148 panthers, Rs. 15 for 3 hyænas, and Rs. 248 for 1,389 other animals, including wild pig, rabid dogs, etc.

A comparison of these statistics with those for 1874 and 1875, given in the first edition, indicates a decrease on the whole in the deaths of human beings from wild beasts, but an increase in those of cattle. The former may be due either to an actual diminution in the number of wild beasts or to better means being now available for the treatment of wounded persons: the latter may be due to more complete returns. The figures relating to animals for whose destruction rewards were given, point to a decrease in the number of larger animals destroyed and an increase in that of smaller and commoner ones.

The necessity for a Game Law has been pressed upon the Government by both planters and sportsmen, principally to prevent the indiscriminate destruction of useful species. A draft Regulation has accordingly been framed and is under consideration, but it is not

intended to create a monopoly in animals in a state of nature for the benefit whether of Government or of sportsmen. In the term "Game" it includes antelope, ibex, jungle-sheep, sambhar and all other descriptions of deer, bison, hares, jungle-fowl, spur-fowl, pea-fowl, partridge, quail, snipe, woodcock, bustard, florican, duck and teal, with such other animals or birds as may be added. The pursuit or killing may be prohibited of any other animals or birds whose destruction may be considered unsportsmanlike. The killing, capture, and pursuit in large numbers of any particular kinds of wild animals or birds for the sake of their skins or plumage for commercial purposes will be restricted by a system of licenses, or prohibited altogether either for a certain time or within a certain area. Fishing in any stream or lake will in like manner be controlled, together with the poisoning of the water, the use of explosive or deleterious substances therein, and the capture of fish by fixed engines and nets of a mesh below a certain size. A season in the year may be fixed in any local area for the killing or capture of game or fish; or it may be prohibited altogether in any local area for five years; or absolutely as regards mature females or young of either sex of any descriptions of game. An exception is made in the case of an owner or occupier of land, who may kill, capture or pursue, within the limits of his land, game doing damage to any growing crop.

Elephants are too valuable to be destroyed, and a special license is required to kill one, which is only permitted when an animal endangers human life or proves destructive to the crops. At the same time the Keddah department was (1873) formed for the capture of elephants. Previous to this the animals were sometimes caught in pits. The pits were about twenty feet deep, and covered with a light network of bamboos, over which was spread a covering of leaves and earth. The earth dug out was carried to some distance. These pits never succeeded during the first year, but in the second year, when they had become overgrown with grass, the elephants were often deceived by them. When an elephant was caught, rubbish was thrown into the pit, which he trod down and gradually formed a path to the top. He was then seized by the tame elephants, without whose aid it would be impossible to secure a full-grown wild elephant, and at the same time ropes were thrown over him by the Kurubas. An elephant who was less than eight months old, when thus snared, could seldom be reared in captivity, and a tusker of any size had never been entrapped. In a graphic description of the rude manner in which the pitfall system was managed, Mr. G. P. Sanderson says:—"The atrocious cruelties to which elephants were subjected by it are too horrible to think of."

The Keddah department, established by him, was highly successful in its first operations, which resulted in the capture of fifty-five elephants in June 1874. Only nine died, and a profit of Rs. 22,000 was made on the affair. The site of the keddahs was near the Biligirangan hills in Chamrajnagar taluq, and Mr. Sanderson's account of what was at that time a novel adventure was given in the first edition.¹ Shortly afterwards he was transferred to Dacca in Bengal for elephant-catching in the Chittagong and Garo hills, where he was equally successful. On his return to Mysore, in June 1876, the great famine was setting in, and instead of catching elephants he was engaged in forming grazing blocks in the border forests for the starving cattle that flocked thither for pasture. Meanwhile the keddahs in Mysore remained in abeyance, and Mr. Sanderson, after a furlough, was again employed in Bengal. But capture by pitfalls was resorted to in 1886, under proper direction, in the Kākankóte and Begur forests, and the District Forest Officer got fifty-two elephants there in this manner in the next five years, when the system was absolutely stopped on the extension of keddahs to that part. Of those caught thirty-five survived, and a profit of Rs. 15,000 was made on the whole. Still, during the periods that the keddahs had been unused, elephants multiplied and became so daring as to ravage crops even close to towns. Mr. Sanderson's services were therefore again applied for, and in 1889 he was placed at the disposal of Mysore for five and a half years. To facilitate operations, twelve trained Kumki elephants were purchased from the Pheelkhana at Dacca, and seventeen more were imported from Burma in 1890. These twenty-nine cost over a lakh. With the exception of a few that died, they have become acclimatized to Mysore, and are in a healthy and serviceable condition.

In a fortnight from Mr. Sanderson's arrival, in July 1889, he captured a herd of fifty-one in the old keddahs constructed by him in 1877. Intimation was then received of the proposed visit of H.R.H. Prince Albert Victor, and it was desired to make a second catch, if possible, for his entertainment in November. The interesting account of how the capture of thirty-seven elephants was effected on that occasion has been contributed by Mr. Sanderson to Mr. Rees' book.² Keddahs were next formed near Kākankóte in 1890, and an extensive use of the telephone was introduced by Mr. Sanderson, for rapid communication from his base camp with the watch-houses at the keddah gates and various points in the jungles, the whole being connected with

¹ A full description of this and other operations will be found in his book called "Thirteen Years among the Wild Beasts of India."

² "The Duke of Clarence and Avondale in Southern India," chap. iv.

the telegraph station at Hunsur, whence messages could be sent all over India. Altogether, in two drives in 1889-90, and three drives in 1890-1, there were 159 elephants caught, and the greater number were sold at Nanjangud, Palghat, and Tellicherry. Excluding the large initial outlay for Kumki elephants and trained hands from the north, with special charges connected with the Royal visit, the expenditure was fairly covered by the receipts, while the stockades, with live and dead stock, remained for future use at a moderate cost for up-keep. In 1891-2 there were two drives, resulting in the capture of seventy-five elephants. Sales were effected at Paschimaváhini and at Haidarabad in addition to the places before mentioned. That the expenditure was much in excess of the receipts was greatly owing to cost of additional telephone materials and instruments. In May, 1892, Mr. Sanderson died. Since then Mr. K. Shamiengar, for a short time his assistant, has been in charge of the keddahs. In two drives in 1892-3¹ and two drives in 1893-4 he was successful in capturing 120 elephants, of which twenty-one died. The disposal of the remainder still left a deficit on the department of about Rs. 22,000. But the network of telephones has been so skilfully laid, both in the Kákankóte and Chamrajnagar forests, as practically to ensure the ultimate capture of every elephant that passes within certain limits, and the expenses will be recouped.

Elephants have of late years become troublesome in the Shimoga and Kadur Districts, destroying sugar-cane and paddy crops, and injuring the areca-nut gardens. Attempts to stop them by shooting some were made, but proved ineffectual. The Keddah department are therefore endeavouring to capture some of the herds, which are small and scattered, in temporary stockades.² The effect of the inroads of elephants has been to drive the field-watchers to the trees, and this has left an opening for wild pig to do more mischief to the crops than before, when the watchers were on the spot to scare them away.

Crops are also liable to considerable damage at times from rats. In the latter months of 1878 something like a plague of rats appeared, especially in the Chitaldroog District, and committed great havoc in the cotton and rice crops of individual villages. Certain kinds of field rat regularly store up a good deal of grain in their burrows near the embankments of fields, which Woddars and various wandering tribes dig up when the ground is out of cultivation and help themselves to the grain.

¹ At the end of 1892 the Viceroy, the Marquess of Lansdowne, witnessed the drive.

² A capture of sixty elephants near Sakrebail has now (November, 1894) been announced.

No one who has travelled much over the Province, especially in the wilder and more secluded tracts of country, but must have noted the immense variety and beauty of the feathered tribes. The naturalist and the sportsman alike will, it is hoped, find every familiar acquaintance included in the following list.¹ It may perhaps be noted that the ostrich has laid eggs and hatched young in the Maharaja's menagerie at Mysore, but they did not live long.

Aves—Hakki.

Passeres.

<i>Corvidæ</i> —Crows— <i>K'iki, K'igi.</i>		<i>Irena puella</i> ...	Fairy blue-bird
<i>Corvus macrorhynchus</i>	Jungle crow	<i>Hypsipetes gan-eesa</i>	South-Indian black bulbul
<i>Corvus splendens</i>	Indian house-crow	<i>Molpastes hæmorrhous</i>	Madras red-vented bulbul
<i>Dendrocetta rufa</i>	Indian tree-pie	<i>Otocompsa fuscicaudata</i>	Southern red-whiskered bulbul
<i>Parus atriceps</i> ...	Indian grey tit	<i>Pycnonotus gularis</i>	Ruby-throated bulbul
<i>Parus nuchalis</i> ...	White-winged black tit	<i>Pycnonotus luteolus</i>	White-browed bulbul
<i>Machlolophus haplonotus</i>	Southern yellow tit	<i>Micropus phæcephalus</i>	Grey-headed bulbul
<i>Crateropopidæ.</i>		<i>Sittidæ</i> —Nuthatches.	
<i>Argya caudata</i> ...	Common babbler	<i>Sitta castaneiventris</i>	Chestnut-bellied nuthatch
<i>Argya malcolmi</i> ...	Large grey babbler	<i>Sitta frontalis</i> ...	Violet-fronted blue nuthatch
<i>Argya subrufa</i> ...	Large rufous babbler	<i>Dicruridæ</i> —Drongos.	
<i>Crateropus canorus</i>	Jungle babbler	<i>Dicrurus ater</i> ...	Black drongo (king-crow)
<i>Crateropus griseus</i>	White-headed babbler	<i>Dicrurus longicaudatus</i>	Indian ashy drongo
<i>Pomatorhinus horsfieldi</i>	Southern scimitar babbler	<i>Dicrurus cærulescens</i>	White-bellied drongo
<i>Dumetia albigularis</i>	Small white-throated babbler	<i>Chaptalia ænea</i> ...	Bronzed drongo
<i>Pycnorhis sinensis</i>	Yellow-eyed babbler	<i>Chibia hottentotta</i>	Hair-crested drongo
<i>Pellorneum ruficeps</i>	Spotted babbler	<i>Dissemurus paradoxus</i>	Larger rocket-tailed drongo
<i>Rhopocichla atriceps</i>	Black-headed babbler	<i>Sylviidæ</i> —Warblers.	
<i>Myophoreus horsfieldi</i>	Malabar whistling thrush	<i>Acrocephalus sten-toreus</i>	Indian great reed-warbler
<i>Larvivora brunnea</i>	Indian blue chat	<i>Acrocephalus dumetorum</i>	Blyth's reed-warbler
<i>Brachypteryx rufiventris</i>	Rufous-bellied short-wing		
<i>Zosterops palpebrosa</i>	Indian white-eye		
<i>Ægithina tiphia</i> ...	Common iora		
<i>Chloropsis jerdoni</i>	Jerdon's chloropsis		

¹ Taken from the volumes on Birds by E. W. Oates, in the *Fauna of British India*.

Acrocephalus agri- cola	Paddy - field reed- warbler
Cisticola erythro- cephala	Red-headed fantail- warbler
Cisticola cursitans	Rufous fantail-war- bler
Franklinia gracilis	Franklin's wren- warbler
Franklinia bucha- nani	Rufous - fronted wren-warbler
Schoenicola platy- ura	Broad-tailed grass- warbler
Chaetornis locus- telloides	Bristled grass - warbler
Arundinax aedon	Thick-billed warbler
Hypolais rama ...	Sykes's tree-warbler
Sylvia jerdoni ...	Eastern orphean warbler
Sylvia affinis ...	Indian lesser white- throated warbler
Phylloscopus affinis	Tickell's willow- warbler
Acanthopneuste nitidus	Green willow-war- bler
Acanthopneuste viridanus	Greenish willow- warbler
Acanthopneuste magnirostris	Large-billed willow- warbler
Prinia socialis ...	Ashy wren-warbler
Prinia inornata ...	Indian wren-warbler
Prinia jerdoni ...	Southern wren- warbler

Laniidae—Shrikes—*Kukkati*.

Lanius vittatus ...	Bay-backed shrike
Lanius erythronotus	Rufous-backed shrike
Lanius cristatus ...	Brown shrike
Hemipus picatus	Black-backed pied shrike
Tephrodornis syl- vicola	Malabar wood - shrike
Tephrodornis pon- dicerianus	Common wood- shrike
Pericrocotus flam- meus	Orange minivet
Pericrocotus pere- grinus	Small minivet
Pericrocotus ery- thropygius	White-bellied mini- vet
Campophaga sykesi	Black - headed cuckoo-shrike
Graucalus macii...	Large cuckoo-shrike
Artamus fuscus ...	Ashyswallow-shrike

Oriolidae—Orioles.

Oriolus kundoo ...	Indian oriole
Oriolus melano- cephalus	Indian black-headed oriole

Eulabetidae—Grackles or talking-mynas.

Eulabus religiosa	Southern grackle
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Sturnidae—Starlings and mynas.

Pastor roseus ...	Rose-coloured star- ling
Sturnia blythii ...	Blyth's myna
Temenuchus pago- darum	Black-headed myna
Acridotherestrictis	Common myna
Æthiopsar fuscus	Jungle myna

Muscicapidae—Flycatchers.

Siphia parva ...	European red- breasted fly- catcher
Cyornis pallidipes	White-bellied blue flycatcher
Cyornis rubecu- loides	Blue - throated fly- catcher
Cyornis tickelli ...	Tickell's blue fly- catcher
Stoparola mela- nops	Verditer flycatcher
Alseonax latirostris	Brown flycatcher
Alseonax ruficau- dus	Rufous-tailed fly- catcher
Ochromela nigri- rufa	Black - and - orange flycatcher
Culicicopa ceylon- ensis	Grey - headed fly- catcher
Terpsiphone para- disi	Indian paradise fly- catcher
Hypothymisazurea	Indian black-naped flycatcher
Rhipidura albi- frontata	White-browed fan- tail flycatcher
<i>Turdidae</i> —Chats, Robins, Thrushes, &c.	
Pratincola caprata	Common pied bush- chat
Pratincola maura	Indian bush-chat
Ruticilla rufiventris	Indian redstart
Thamnobia fulicata	Black-backed In- dian robin
Copsychus saularis	Magpie robin
Merula nigripileus	Black-capped black- bird
Geocichla wardi...	Pied ground-thrush

Geocichla cyanotus	White - throated ground-thrush
Petrophila cinclorhyncha	Blue-headed rock-thrush
Petrophila cyanus	Western blue rock-thrush

Ploceidae—Weaver-birds.

Ploceus baya ...	Baya
Ploceus manyar ...	Striated weaver-bird
Munia malacca ...	Black-headed munia
Uroloncha striata	White-backed munia
Uroloncha malabarica	White - throated munia
Uroloncha punctulata	Spotted munia
Sporægnithus amandava	Indian red munia

Fringillidae—Finches.

Carpodacus erythrinus	Common rose-finch
Gymnorhis flavicollis	Yellow - throated sparrow
Passer domesticus	House-sparrow
Emberiza luteola...	Red-headed bunting

Hirundinidae—Swallows.

Chelidon urbica ...	Martin
Ptyonoprogne rufepetris	Crag-martin
Ptyonoprogne concolor	Dusky crag-martin
Hirundo rustica ...	Swallow
Hirundo smithii...	Wire-tailed swallow
Hirundo fluvicola	Indian cliff-swallow
Hirundo nepalensis	Hodgson's striated swallow
Hirundo erythropygia	Sykes's striated swallow

Motacillidae—Wagtails and Pipits.

Motacilla maderaspatensis	Large pied wagtail
Motacilla melanope	Grey wagtail
Motacilla borealis	Grey-headed wagtail
Limonidromus indicus	Forest wagtail
Anthus maculatus	Indian tree-pipit
Anthus striolatus	Blyth's pipit
Anthus rufulus ...	Indian pipit

Alaudidae—Larks.

Alauda gulgula ...	Indian sky-lark
Mirafraga cantillans	Singing bush-lark
Mirafraga affinis ...	Madras bush-lark
Galerita deva ...	Sykes's crested lark
Ammomanes phoenicura	Rufous-tailed finch-lark
Pyrrhuloxia grisea	Ashy - crowned finch-lark

Nectariniidae—Sun-birds.

Arachnechthra lotenia	Loten's sun-bird
Arachnechthra asiatica	Purple sun-bird
Arachnechthra minima	Small sun-bird
Arachnechthra zeylonica	Purple-rumped sun-bird
Arachnothera longirostris	Little spider-hunter

Dicaeidae—Flower-peckers.

Dicaeum erythrorhynchus	Tickell's flower-pecker
Piprisoma squilidum	Thick-billed flower-pecker

Pittidae—Pittas.

Pitta brachyura ...	Indian pitta
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As Mr. Oates' work stops here, the remainder is taken from J. A. Murray's *Indian Birds* or the *Avifauna of British India*. But, from the two works not being arranged on the same system, I have endeavoured to give the information from the latter in the order in which it is presumed it will appear in the former when completed.

Macrochires.*Cypselidae*—Swifts.

Cypselus melba ...	Alpine swift
Cypselus affinis ...	Common Indian swift
Cypselus batassiensis	Palm swift
Hirundinapus indicus	Indian giant spine-tail

Hirundinapus sylvatica	White - rumped spine-tail
Collocalia unicolor	Indian edible-nest swiftlet
Dendrochelidon coronatus	Indian crested tree-swift

Caprimulgidae—Goat-suckers.
Caprimulgus mah- Sykes's night-jar
rattensis
Caprimulgus mon- Franklin's night-jar
ticolus

Caprimulgus atri- Ghaut night-jar
pennis
Caprimulgus indicus Jungle night-jar
Caprimulgus kela- Nilgiri night-jar
arti

Pici.

Picidae—Woodpeckers—*Mara-kuṭaka*.
Yunx torquilla ... Common wryneck
Tiga jaranensis ... Common large three-
toed woodpecker
Brachypternus au- Golden - backed
rantias woodpecker
Brachypternus chry- Lesser golden-
sonotus backed wood-
pecker
Micropternus gula- South-Indian rufous
ris pecker

Gecinus striolatus Blyth's striated
green wood-
pecker
Thriponax hodg- Great black wood-
soni pecker
Chrysocolaptes fes- Black-backed wood-
tivus pecker
Picus mahrattensis Yellow-fronted pied
woodpecker
Iyngificus hard- Southern pigmy
wickii woodpecker

Coccyges.

Cuculidae—Cuckoos—*Kōgila*.
Cuculus striatus ... Asiatic cuckoo
Cuculus sonneratii Banded cuckoo
Hierococcyx varius Common hawk
cuckoo
Cacomantis nigra Indian plaintive
cuckoo
Coccytes jacobinus Pied-crested cuckoo
Coccytes corom- Red-winged crested
mandus cuckoo
Eudynamys honorata Indian koel
Rhopodytes viridi- Small green-billed
rostris malkoha
Centrococcyx rufi- Common crow pheas-
pennis sant
Centrococcyx ben- Lesser coucal
galensis
Taccocua leschen- Southern sirkeer
aulti
Capitonidae—Barbets.
Megalæma cani- Common green
ceps barbet
Megalæma viridis Small green barbet
Xantholæma hæma- Crimson - breasted
cephala barbet
Xantholæma māla- Crimson - throated
barica barbet

Upupidae—Hoopoes.
Upupa epops ... Hoopoe
Meropidae—Bee-eaters.
Merops viridis ... Common Indian
green bee-eater
Merops phillipinus Blue-tailed bee-eater
Merops leschen- Chestnut - headed
aulti bee-eater
Nyctiornis ather- Blue - necked bee-
toni eater
Coraciidae—Rollers.
Coracias indica ... Indian roller
Alcedinidae—Kingfishers.
Alcedo bengalensis Little Indian king-
fisher
Ceryle rudis ... Pied kingfisher
Halcyon smyrnen- White - breasted
sis kingfisher
Ceyx tridactyla ... Three-toed kingfisher
Pelargopsis gurali Indian stork-billed
kingfisher
Bucerotidae—Hornbills.
Dichoceros bicornis Great pied hornbill
Anthracoseros Malabar pied horn-
coronatus bill
Ocyeros birostris Common grey hornbill

Psittaci.

Psittacidae—Parrots—*Gini*.
Loriculus vernalis Indian loriquet
Palæornis torquatus Rose-ringed paroquet

Palæornis rosa ... Western rose-
headed paroquet

Striges.

Bubonidae—Eagle and Scops Owls.
 Bubo bengalensis Rock horned owl
 Bubo nipalensis ... Forest eagle owl
 Scops pennatus ... Indian scops owl
 Scops malabaricus Malabar scops owl
 Carine brama ... Spotted owl
 Ninox scutulata ... Brown hawk owl
 Glaucidium radiatum Jungle owl

Glaucidium mala- Malabar owl
 baricum
 Asio accipitrinus... Stout-eared owl
 Symnium ocellatum Mottled wood-owl
 Symnium indrance Southern wood-owl

Strigidae—Owls—*Gûbe, gûge.*

Strix flammea ... Indian screech-owl
 Strix candida ... Grass-owl

Accipitres.

Vulturidae—Vultures—*Haddu.*
 Gyps indicus ... Long-billed vulture
 Pseudogyps bengalensis — rana Common brown vulture
 haddu
 Otogyps calvus ... Black vulture

Falconidae—Falcons—*dége.*

Circus pygargus ... Montague's harrier
 Circus macrurus... Pale harrier
 Circus æruginosus Marsh harrier
 Asturtrivirgatus... Crested goshawk
 Astur badius ... Brown hawk
 Accipiter nisus— European sparrow-
 bannada *dége* hawk
 Accipiter virgatus Besra sparrow-hawk
 —ur-chitlu
 Buteo ferox ... Long-legged buzzard
 Aquila heliaca ... Imperial eagle
 Aquila vindhiana Tawny eagle
 Aquila clanga ... Spotted eagle
 Nisæetus fasciatus Crestless hawk-eagle
 Nisæetus pennatus Dwarf or booted eagle
 Neopus malayensis Black eagle
 Spizæetusnipalensis Spotted hawk-eagle

Spizæetus cirrhaus Crested hawk-eagle
 —juttu bhairi
 Circæetus gallicus Common serpent-eagle
 Spilornis melanotis Southern harrier-eagle
 Butastur teesa ... White-eyed buzzard
 Haliastur indus— Maroon-backed kite
 garuda (Brahmini kite)
 Milvus govinda ... Common Indian kite
 Milvus melanotis Large Indian kite
 Pernisptilonorhynchus Honey buzzard
 Baza lophotes ... Black-crested kite
 Microhierax cærulescens White-naped pigmy falcon
 Falco communis— Peregrine falcon
 bhaira
 Falco peregrinator Shaheen falcon
 —*dége*
 Falco juggur — Lugger falcon
 gidaga
 Falco chiquera ... Red-headed merlin
 Hierofalco saker... Cherrug falcon
 Polioætui ichthyætus Eastern white-tailed eagle

Steganopodes.

Pelecanidae—Pelicans.
 Pelecanus roseus... Eastern white pelican

Phalacrocorax pyg- Little cormorant
 mœus
 Plotus melanogaster Indian snake-bird

Herodiones.

Ciconiidae—Storks—*Baka.*
 Leptopilus javanicus Lesser adjutant
 Xenorhynchus asiaticus Black-necked stork
 Ciconia leucocephala White-necked stork

Ardeidae—Herons—*Kokkare.*
 Ardea cinerea ... Common heron
 Ardea purpurea... Blue heron
 Herodias alba ... Large white heron
 Herodias garzetta Little black-billed white heron
 Bubulcus coromandus Cattle egret

Ardeola grayi ..	Pond heron, paddy bird	Nyctorax griseus...	Night heron
Butorides javanica	Little green bittern	<i>Tantalidae.</i>	
Ardetta flavicollis	Blue bittern	Tantalus leucocephalus	Pelican ibis
Ardetta cinnamomea	Chestnut bittern	Platalea leucorodia	Spoonbill
Ardetta sinensis...	Little yellow bittern	Threskiornis melanocephalus	White ibis
Botaurus stellaris	Common European bittern		

Anseres.

<i>Anatidae</i> —Ducks— <i>Bitu.</i>		Casearca rutila ...	Brahmini duck
Sarkidiornis melanonotus	Comb duck	Spatula clypeata...	Shoveller
Nettapus coromandelianus	Cotton teal	Dafila acuta ...	Pintail
Dendrocygna javanica	Lesser whistling-teal	Querquedula crecca	Common teal
		Fuligula cristata...	Tufted pochard
		<i>Podicipidae</i> —Grebes.	
		Podiceps minor ...	Dab-chick

Columbæ.

<i>Treronidae</i> —Fruit Pigeons.		<i>Columbidae</i> —Pigeons and Doves— <i>Pterodila.</i>	
Crocopus chlorogaster	Southern green pigeon	Columba intermedia	Indian blue rock-pigeon
Osmotreron malabarica	Malabar green pigeon	Turtur meena ...	Rufous turtle-dove
Carpophaga tena	Imperial green pigeon	Turtur senegalensis	Little brown dove
Carpophaga insignis	Bronze-back imperial pigeon	Turtur risorius ...	Indian ring-dove

Gallinæ.

<i>Pterolidae</i> —Sand grouse.		<i>Tetraonidae.</i>	
Pterocles fasciatus	Painted sand grouse	Francolinus pictus	Painted partridge
<i>Phasianidae</i> —Peafowl— <i>Navilu.</i>		Ortygornis ponticriana	Common grey partridge
Pavo cristatus ...	Common peacock	Perdica asiatica	Jungle bush quail
<i>Megapodidae.</i>		Perdica argoon-dah	Rock bush quail
Gallus ferrugineus	Common jungle-fowl	Microperdix erythrorhyncha	Red-billed bush quail
Gallus sonnerati ..	Grey jungle-fowl	Coturnix communis	Large grey quail
Galloperdix spadicus	Red spur-fowl	<i>Tinamidae.</i>	
Galloperdix lunulatus	Painted spur-fowl	Turnix plumbipes	Indo-Malayan bustard quail

Geranomorphæ.

<i>Otitidae</i> —Bustards and floricans.		Lobivanellus indicus	Red-wattled lapwing
Sypheotides auritus	Lesser florikan	Sarciophorus bilobus	Yellow-wattled lapwing
<i>Cursoridae</i> —Courier plovers.		Edicnemus crepitans	Stone plover
Cursorius coromandelicus	Indian courier plover	<i>Gruidæ</i> —Cranes— <i>Kakva.</i>	
Charadrius fulvus	Eastern golden plover	Grus cinerea ...	Common crane
		Anthropoides virgo	Demoiselle crane

Limicolæ.

<i>Scolopacide.</i>		Himantopus candidus	Stilt
Scolopax rusticola...	Woodcock	<i>Rallidæ</i> —Rails.	
Gallinago nemoricola	Wood snipe	Porphyrio poliocephalus	Purple coot
Gallinago scolopacina	Common snipe	Fulica atra	Bald coot
Gallinago gallinula...	Jack snipe	Porzana bailloni	Pigmy rail
Machetes pugnax ...	Ruff	Porzana maruetta	Spotted crane
Actitis ochropus ...	Green sand-piper	Gallinula chloropus	Moorhen
Totanus glareola ...	Wood sand-piper	Gallinula phoenicura	White-breasted water-hen
Totanus calidris ...	Red shank		
Recurvirostra avocetta	Avocet		

Gaviæ.

<i>Laridæ.</i>		Rhynchops albi-	Indian skimmer
Sterna melanogastra	Black-bellied tern	collis	

The remaining orders—Tubinares and Pygopodes—I have not succeeded in identifying. Perhaps some of the entries under Cocyges should come here.

REPTILES.

“The few crocodiles that are found in the Mysore rivers very rarely attack people (says Mr. Sanderson¹); and fishermen, who pay no heed to them, have told me that if they come upon a crocodile whilst following their employment, it will skulk at the bottom and not move though handled, apparently believing it escapes observation.”

The loss of life from snake-bite may be gathered from the following particulars:—In 1889-90 there were 97 human beings and 32 cattle killed by snakes; in 1890-1 the numbers were 77 and 8; in 1891-2 they were 109 and 31. The amounts paid in these three years as rewards for the destruction of venomous snakes were Rs. 678 for 2,579, Rs. 690 for 2,589, and Rs. 664 for 2,873 respectively. So far as the figures go, the loss of life, as compared with what was reported in the first edition fifteen years ago, is certainly diminished, and this may possibly be the result of the improved sanitary arrangements in towns and villages, whereby much of the rubbish around dwelling-houses which formerly gave cover to snakes is now regularly cleared away.

Reptilia.²

Emydosauria—Crocodiles.

Crocodylidae—Crocodiles—*Mosale*.

Gavialis gangeticus Crocodylus palustris

Chelonia—Tortoises and Turtles.

Trionychidæ—Tortoises—*A'ne*.

Trionyx leithii

Testudinidæ.

Testudo elegans ... Hál áme... .. Nicoria trijuga ... Muriki áme

¹ “Thirteen Years among the Wild Beasts of India,” p. 14.

² Compiled from the volume by G. A. Boulenger in the *Fauna of British India*.

Squamata—Lizards and Snakes.*Geckonidæ*—Geckos—*Qti, ôti-kâta*.

Gymnodactylus nebulosus ...	...	...	Hemidactylus frenatus
Gymnodactylus deccanensis...	...	...	Hemidactylus gleadovu Halli
Gonatodes mysoriensis ...	...	...	Hemidactylus maculatus
Gonatodes gracilis ...	...	...	Hemidactylus triedrus
Hemidactylus reticulatus ...	...	...	Hemidactylus costæi Halli

Eublepharidæ.

Enblepharis hardwickii

Agamidæ.

Sitana ponticeriana ...	...	...	Calotes ellioti
Calotes versicolor ...	O'ti	...	Charasia dorsalis

Varanidæ—Lizards—*Halli*.

Varanus bengalensis... U'saravalli

Lacertidæ.

Cabrita leschenaultii... *Ophiops jerdonii

Scincidæ—Skinks—*Háva râni*.

Mabina carinata ...	...	...	Lygosoma albopunctatum
Mabina macularia ...	..	...	Lygosoma punctatum

Chamæleonidæ—Chameleons—*Gósumbe*.

Chamæleon calcaratus

(Ophidia)*Typhlopidae*—Worm-like snakes.

Typhlops braminus ... Typhlops acutus

Boidae—Pythons or boas.

Python molurus ... Dásara hávu
Gongylophis conicus... Eryx johnii¹

Uropellidæ—Earth snakes.

Rhinophis sanguineus ... Silybura phipsonii
Silybura ellioti ... Pseudoplectrurus canaricus

Colubridæ—Snakes—*Hávu*.

Xylophis perroteti ... Tropidonotus piscator . Nír hávu
Lycodon striatus ... Tropidonotus plumbicolor Hasur hávu
Lycodon aulicus ... Helicops schistosus
Hydrophobus nympha ... Dipsas trigonata
Ablabes calamaria ... Dryophis perroteti
Simotes arnensis ... Dryophis mycterizans Hasur núlige
Oligodon venustus
Oligodon subgriseus...² Hypsirhina enhydris ... Nír hávu
Zamenis mucosus² ... Kére ... Callophis nigrescens
Zamenis fasciolatus ... Bungarus fasciatus
Coluber helenæ ... Bungarus cæruleus³ ... Gódi nágara
Dendrophis pictus ... Naia tripudians⁴ ... Nágara hávu
Tropidonotus stolatus ... Naia bungarus

Viperidæ—Vipers.

Vipera russellii ... Kolaku-mañala Echis carinata... Kallu hávu

¹ The so-called two-headed snake. ² Rat snake or whip snake (*dhámin* in Hindi).

³ Known as the krait.

⁴ The cobra or cobra de capello.

Batrachia.

Ranidae—Frogs—*Kappe*.

Rana hexadactyla	...	...	...	Rana limnocharis
Rana cyanophlyctis ¹	...	...	...	Rana breviceps
Rana tigrina	...	...	...	Rana beddomii

Engystomatidae.

Microhyla ornata	...	...	...	Callula variegata
Callula pulchra	...	...	...	Cacopus systema

Bufo—Toads.

Bufo melanostictus

FISHES.

“The rivers and artificial lakes in Mysore abound with excellent fish, but I have never succeeded in getting much sport with the fly (writes Mr. Sanderson).² They may be taken by spinning or ground fishing—the latter chiefly at night. There is now in the Museum at Bangalore the head and skin of a fish—a species of carp or *mahseer*, and called *bili* or silver-fish in Canarese—caught by me in 1871 in the Lakshmantirtha, which measured sixty inches in length and thirty-eight in girth. The circumference inside the mouth when caught was twenty-four inches. I was unfortunately unable to weigh this fish, but I estimated it by rough tests at not less than 100 lbs. I have seen much larger fish, without doubt upwards of 150 lbs., caught by natives, chiefly by netting during the months when the rivers are low. At such times two or three villages of professional fishermen will combine to net a single large fish known to be a prisoner in a pool during the hot weather. The pool may be a hundred yards long and broad, and the water fifteen feet deep, with cavernous rocks capable of sheltering fish; but by joining their nets, and diving and working for two or three days, they seldom fail to secure the prize.”

The following list has been compiled from Dr. Day's book.³ A number of native names of fish, not identified, will be found under each District in Vol. II.

Pisces—Mfnu.

Teleostei.

Siluridae—Cat-fishes.

Clarias magur	...	Marave—Black cat-fish	Callichrous bima- culatus ⁴	Godale
Saccobranchus fos- silis	Chélu mfnu — Yel- low catfish, scor- pion fish		Pseudentropius atherinoides	Bále .. Ladyfish
Wallago attu	...	Vale, ole	Macrones vittatus ⁵ Macrones keletius	Geralu
			Rita hastata	

¹ (?) The chunam or flying frog. ² *Op. cit.* ³ In the “Fauna of British India.”

⁴ *Puffa* in Hindustani: called the “butter-fish” by Europeans in Bengal.

⁵ Dr. Day has the following note:—“This fish is termed ‘the fiddler’ in Mysore;

<i>Cyprinidae</i> —Carp.		Barbus vittatus
Lepidocephalichthys thermalis		Chela argentea White carp
Nemachilus guentheri		Chela boopis
Nemachilus semiarmatus		Chela clupeoides
Nemachilus denisonii		<i>Percidae</i> —Perches.
Nemachilus beavani		Ambassis nama
Discognathus lamta	Pandipakke (korafi kaoli, Hind.)	Ambassis ranga
Labeo fimbriatus		<i>Nandidæ.</i>
Labeo calbassu ...	Kari minu	Badis buchamani
Labeo kontius		Badis dario
Cirrhina cirrhosa		Nandus marmoratus
Cirrhina reba		Pristolepis marginata
Matsya argentea		Pristolepis malabarica
Barbus chagunio		<i>Gobiidae.</i>
Barbus sarana ...	Gid pakke	Gobius giurus ... Abbroni
Barbus chrysopoma		<i>Rhynchobdellidae.</i>
Barbus micropogon		Mastacembalus ar-
Barbus carnaticus	Gid pakke (Giddi kaoli, Hind.)	matus Thorny-backed
Barbus tor ¹		<i>Ophiocephalidae.</i>
Barbus carmuca		Ophiocephalus Hurvina maral
Barbus melanampyx		marulius
Barbus parrah ...	(Kacha korava, Hind.)	Ophiocephalusleu- Bili korava
Barbus dorsalis ...	Mar pakke	copunctatus
Barbus kolus		Ophiocephalus Kuchina maral
Barbus melanostigma		striatus
Barbus puckelli		Ophiocephalus Mar korava
Barbus arulius ..	aruli	guchua
Barbus ticto ..	(Kaoli, Hind.)	Ophiocephalus Bálu, béli korava
		punctatus

INSECTS.

Of the countless hosts and varieties of the insect world, no pretension can be made to give anything like a detailed list. The leading families alone are indicated. Of spiders, beetles, and the singular mantis tribe, there is a great profusion; as also of the gayest butterflies and richest moths. The bee (except in parts of the Malnád) is never domesticated, but large quantities of honey are obtained by jungle tribes from the woods and caves of various parts. White ants swarm in every soil, and their ravages are relentless. On one or two evenings following on the first heavy showers of the monsoon, which

I touched one which was on the wet ground, at which it appeared to become very irate, erecting its dorsal fin and making a noise resembling the buzzing of a bee, evidently a sign of anger. When I put some small carp into an aquarium containing one of these fishes it rushed at a small example, seized it by the middle of its back, and shook it like a dog killing a rat; at this time the barbels of the *Macrones* were stiffened out laterally like a cat's whiskers."

¹ The mahseer of sportsmen.

have softened the parched and dried-up ground, their winged nymphs issue in gauzy clouds to enjoy a brief flight; and then, losing their wings, which strew the whole surface of the ground, crawl about in the form of maggots, a prey to every bird of the air and every creeping lizard. They are also gathered and cooked for food by the lower orders. The tiny mango-flies or eye-flies, which swarm during the hours of sunlight, especially in the mango season, are a well-known source of annoyance. To them is attributed a kind of ophthalmia, termed "sore eyes," to which children especially are subject; but whether the flies originate the affection or merely convey the contagious matter from eye to eye is doubtful. Among insect pests the coffee-borer has already been mentioned (p. 168). At the beginning of 1878 a new danger appeared in vast flights of locusts, which threatened to destroy the first early crops that succeeded the great famine. But, fortunately, the damage they did was far less than the most sanguine could have expected.¹

Annelida—Suctorio.

Hirudinidæ .. jigani ... Leeches ... Abound at the Gersoppa Falls and in all forests during the wet season.

Arachnida.

Araneidæ	} ...	jáda	...	Spiders	...	Very numerous and of great variety.
Lycosidæ						
Mygalidæ						
Scorpionidæ		chélu	...	Scorpions	...	There are three species; the large black rock-scorpion (<i>mandragabbe</i>), the large red field scorpion, and the little red house scorpion. The sting is very rarely fatal, but often causes great pain for a time.
Acaridæ	...	...	...	Mites		
Sarcoptes		kajji huḷa		Itch acarus		This loathsome affection is very common, even among the upper classes of natives.
scabiei						
Ixodidæ	...	uṇṇe	...	Ticks		

¹ A flight of locusts which passed over Mandya on the evening of the 16th of May, 1800, is thus described by Buchanan :—" It extended in length probably about three miles; its width was about a hundred yards, and its height fifty feet. The insects passed from west to east in the direction of the wind, at the rate of six or seven miles an hour. The whole ground, and every tree and bush, was covered with them, but each individual halted for a very short time on any one spot. In an hour after the flock had passed few were to be discovered in the neighbourhood of the town. The noise of this immense number of insects somewhat resembled the sound of a cataract. At a distance they appeared like a long, narrow, red cloud near the horizon, which was continually varying its shape. The locusts were as large as a man's finger, and of a reddish colour." A flight the previous year had eaten up all the young Jola: the present flight settled at a village to the eastward of Mandya, and did the same.

Myriapoda.

Iulidæ.

Iulus indus ...; bandi basava Very common.

Scolopendridæ .. jari ... Centipedes There are several species, differing in size and colour; the largest is of a greyish colour with crimson legs; of the smaller kinds, one is black and another of a sandy or ashy colour.

Polydesmidæ

Insecta.

Anoplura.

Pediculus hénu ... Louse ... Every one must be familiar with the sight of native women removing this unpleasant occupant from one another's hair. The same operation may be constantly witnessed among the common monkeys.

Hemiptera.

Scutellera

Phlæa

Cimex tigani ... Bug

Neides

Cicada

Fulgora minchu huja Firefly

Aphis These are of great variety and beauty on different kinds of trees.

Coccus Cochineal insect

C. lacca ... aruga ... Lac insect

Kermes Gall insect

Orthoptera.

Mantis religiosa Praying mantis There are numerous species, of various sizes and colours; some appear to have the power of changing colour like a chameleon.

Phasma Animated straw

Phyllium Leaf-like insects Several of these are of great beauty and curiosity. One is an exact counterpart of the mango leaf.

Gryllus .. jille Crickets ... Very numerous and various. The stridulation of the tree cricket and the mole cricket are at times, in certain localities, almost deafening.

Locusta ... patanga, midite .. Grasshoppers

Acridium ... midite, toppu ... Locusts ... These insects are here comparatively harmless.

Blatta ... jirle Cockroaches

Neuroptera.

Libellula ...	túni huḷa ...	...	Dragon fly	
Ephemera				
Myrmeleon	...	...	Ant lion ...	.. Very common.
Termes ...	geddalu	White ants	... Universal : their nest or ant-hill is called <i>hutta</i> : the winged nymphs, which issue in swarms in the rains, are called <i>ichalu huḷa</i> .

Aphaniptera.

Pulex irritans	chikaṭa	Common flea
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Diptera.

Culex ...	gungaru	Gnat	
Tipula Daddy longlegs.
Culex ...	soḷḷe	Mosquito...	... A well-known pest.
Musca ...	noṇa ...	...	Fly	... All varieties.
			Mango fly or eye fly	Very numerous at Bangalore in the mango season. It is no bigger than a flea.

Lepidoptera.

Rhopalocera	chitte, kapate, ¹ pá-tragitte, ² sitádevi huḷa		Butterflies	... A very great variety :— Nymphalidæ, 34 species ; Lycænidæ, 28 species ; ³ Papilionidæ, 16 species. ⁴
Heterocera	nusi ...	...	Moths	
Bombyx mori	réshmi huḷa	...	The caterpillar is the silkworm.	

Hymenoptera.

Ichneumon				
Formica ...	iruve ...	...	Ants	.. Abound in every part in great variety.
Vespa ...	kaṇajada huḷa	...	Wasp and hornet	
Apis ...	jénu huḷa	...	Honey bee	
Xylocarpa	jirangi ...	...	Carpenter bee	
Bombus	...	...	Bumble bee	

Coleoptera.

Scarabæus	dumbe ...	...	Beetles	.. Beetles abound in great profusion, and of much beauty of form and colouring.
Buprestis ...	hasar dumbe	...	Green beetles	.. The wings are used for the decoration of slippers, &c.
Carabus				
Copris ...	...	...	Dung beetle	... Very common on every road.

¹ The plain or sober-coloured ones. ² Those with gay and variegated colours.

³ From Marshall and de Nicéville's work *The Butterflies of India* (no more published).

⁴ From Donovan.

Of *insects useful to man* the most important are the silk-producing worms, the lac and cochineal insects, and bees.

Silkworm.—The fatality which attended the rearing of silkworms for some years, and checked an industry that was a source of livelihood to large numbers of Muhammadans, is noticed in Vol. II. ; together with the efforts that were made at the time, though ineffectually, to re-establish a healthy race of insects, more especially by Signor de Vecchj, in connection with a Silk Filature Company at Kengeri, Bangalore District. The industry has now revived and is again flourishing, owing to the comparative immunity of the worms from disease. Silk is produced in all the taluqs of the Bangalore District, as well as in Chik Ballapur and Tirumakudal Narsipur taluqs.

Tasar Silkworm.—The domestication of the tasar silkworm was advocated some years ago, as the cocoons have been found in the jungles around Nandidroog and Devarádroog. The following notes on the subject are taken from Captain Coussmaker's reports at the time :

There are four ways in which the tasar silk cocoons may be procured, all of which I myself have successfully tried. Firstly :—During the hot weather, when the leaf is off ; then the cocoons are easily discernible hanging like berries from the twigs ; men might then go into the jungles and collect them. Secondly :—From June to October the caterpillars are large and commit much ravage on the trees. Their presence then is easily detected by the denuded appearance of the twigs, and by their droppings under the tree (the large caterpillars do not wander at all, but eat steadily along one twig, devouring leaf after leaf) ; men might then go and collect them all on to one tree, beneath which they themselves might build a hut and live, scaring away birds, squirrels, &c. Both of these methods are practised in the Bengal Presidency. Thirdly :—The moths can be paired when they issue from the cocoons, and the caterpillars reared from the eggs. Fourthly :—When the moths issue from the cocoons, the females can be tied up to certain trees and the males liberated there, when, if any of these latter be not in full vigour, wild males may come and pair with the females, which can then be removed.

In hatching out and rearing the caterpillars there is no difficulty ; twigs of whatever tree is most convenient to use should be put into earthen pots full of earth and water, the mouths of which should, as recommended by Captain Hutton, be closed with cotton rammed in, to keep the twigs steady and to prevent the caterpillars crawling down into the water and drowning themselves. For the first fifteen days, during which the caterpillars wander about much, the pots should be kept each in a small wooden frame, the opposite sides of which should be covered with mosquito net or fine bamboo chicks, so that the light and air may penetrate freely and the worms not escape. After that time the pots should be put upon shelves or tables with

the twigs interlacing so as to form a long hedge, and left uncovered. The caterpillars should be kept there until they change their skins for the last time, when they may be put on to twigs suspended over bamboos hung from the ceiling; and here they will spin their cocoons, which may be gathered every day when the twigs are renewed. In all cases the twigs should be changed every day—those that are old and stripped, thrown away; those that the caterpillars are on, should be put near the fresh twigs, and they will crawl off of their own accord. It is advisable to water them two or three times a day from a watering-pot with a very fine rose; give them a gentle shower as it were: this is refreshing both to caterpillars and twigs. I have noticed that in changing their skins, it sometimes happens that the old skin does not come off freely. I think that a moderate amount of moisture is essential to their well-doing. In this way, with the least possible trouble and expense, any amount of these caterpillars can be reared; ordinary precautions being taken to protect them from their numerous enemies, by stopping rat-holes, sweeping away cobwebs, nailing wire netting or bamboo chinks over the windows, which should be kept open by night and day.

I am glad to see that Mr. Massa reports so favourably upon the specimens of tasar silk cloth. I myself am greatly indebted to Mr. R. S. De Souza, the jailor at Dharwar, at whose suggestion the twilled variety was wove, and it was through his ready assistance and careful supervision that the specimens were obtained.

Experiments have also been made with the Eri silkworm from Assam, which feeds on the leaves of the castor-oil plant; and with a variety of gold-lace cocoons found in the jungles of Hassan.

Cochineal.—The introduction of the cochineal insect was proposed as a partial remedy for the failure of the silk industry. Regarding it the following extract is taken from a memorandum by Colonel Boddam:—

One hundred years ago the Hon'ble Court of Directors attempted to introduce cochineal culture into India, and offered a reward of £2,000 to any one successfully importing it. In 1795 a naval officer secretly imported some cochineal insects from Brazil, which were distributed over India, and cultivation fostered by the Court of Directors. After expending two lakhs of rupees it was discovered that the wrong insect had been got. There are two sorts of cochineal insect—the *silvestre* or wild one, and the *grana-fina* or domesticated one; the latter only producing the cochineal of commerce. It unfortunately was the *silvestre* that had been imported, and was not worth the trouble of cultivating. The *grana-fina* has never been successfully imported. Besides getting the true insect, the proper cactus for its support is necessary; the common *opuntia ficus indica*, or prickly-pear, will not suit the domesticated kind. It must be *opuntia cochinellifera* or *opuntia tuna*. Referring to Kew as to the correct cactus, authorities differed. After much correspondence this point was settled, and I got the true *cactus cochinellifera*, compared the plants so named growing at the Botanical Gardens in Calcutta,

Madras and Bangalore, and found them identical, corresponding with the description of cactus at Teneriffe.

After reviewing all that has been done, the writer in Watt's Dictionary says :—"The first and most natural step towards the introduction into India of a commercial industry in cochineal should be the thorough investigation of the races of cocoons already existing in the country and the plants on which they feed."

Lac Insect.—The lac insect is found in several parts, as near the Nandi hills. The tree on which it feeds is the *jálári* (*shorea talura*, Roxb.) All the trees, says Buchanan, are small, not exceeding eight or ten feet in height ; and their growth is kept down by the insect and its managers ; for this size answers best. The tree, left to itself, grows to a large size and is good timber. For feeding the insect, it thrives very well in a dry barren soil ; and is not planted, but allowed to spring up spontaneously as nature directs. In Kártika, or from about the middle of October to the middle of November, the *lac* is ripe. At that time it surrounds almost every small branch of the tree, and destroys almost every leaf. The branches intended for sale are then cut off, spread out on mats, and dried in the shade. A tree or two that are fullest of the insects are preserved to propagate the breed ; and of those a small branch is tied to every tree in the month Chaitra, or from about the middle of March to the middle of April ; at which time the trees again shoot out young branches and leaves. The *lac* dried on the sticks is sold to the merchants. This is what is called *stick-lac*, which, after the dye has been extracted, is formed into *seed* and *shell-lac*.

Bees.—The bees are described by Buchanan as of four kinds. That from which most of the honey and wax is procured is called *hej-jénu-hula*. This is a large bee, which builds under projections of the rocks or in caverns. A large nest gives eight seers of honey = 4·85 lb., and three seers of wax = 1·82 lb. A small hive gives about one-third of this quantity. The honey is gathered twice a year, in A'sháḍha and Mágha, or in the month following the summer solstice and the second after that of winter. Some people of the Bedar caste make the collecting of honey and wax a profession, and it is one attended with much danger. Having discovered a hive, some of them kindle a fire under the rock, and throw on it the leaves of the *cassia fistula* and of the *puleseri*, which emit a smoke so acrid that nothing living can endure it. The bees are forced to retire ; and some others of the Bedar, so soon as the smoke subsides, lower down by a rope one of their companions, who with a pole knocks off the nest and is immediately drawn up again ;

for if he made any delay the bees would return, and their stinging is so violent that it endangers life. In order to fortify him against the sharp points of rocks, and against injury from the rope which passes round his chest, the adventurous Béda is secured before and behind by several folds of leather.

The bee that produces the next greatest quantity of honey is called the *kaddi* or *chittu-jénu-hula*; that is, stick or small honey. This bee is very small, and builds around the branch of a tree a comb of an oblong shape and sharpened at both ends. It is found at all seasons, but is in the greatest perfection at the same time with the other. The honey is of the finest quality; but the whole comb seldom weighs more than two seers, or 1 2lb. This bee does not sting, and is readily driven away by a twig switched round the comb.

The *tuḍuve* is a bee of which the honey is of an excellent quality, but rarely procured; for it generally builds deep in the crevices of rocks, where it is totally inaccessible. Sometimes, however, it is found in hollow trees, and one hive will give from twenty to twenty-five seers of honey, or about twelve or fifteen pounds; but the quantity of wax is in proportion small. This is a large bee; but it very seldom stings those who plunder its hive.

The *toriga* is a very small bee, that seldom stings. It takes possession of the deserted nests of the white ants, which in this country are very numerous in the wastes of red soil such as is usually cultivated for rági. Of this stiff earth the white ants raise hills resembling the stump of a tree, which are from four to six feet high, very hard, and able long to resist the heaviest rain. These, when deserted, most commonly become the lurking-places of snakes; but sometimes give shelter to the *toriga* bee. Its nest is therefore easily accessible; but it is very small, and contains only about a seer of honey and half a seer of wax.

DOMESTIC ANIMALS.

Horses.—The only native breed of horses is, as in most parts of India, an ill-shaped, vicious *tattu*; as a rule not exceeding twelve hands in height.¹ In spite of the pains which Haidar and Tipu took to improve the Mysore breed by importation, even their far-famed cavalry were as a rule badly mounted. The former Silahdár horses, sprung generally from Arab sires and Mahratta dams, were probably fair specimens of the class of animal which supplied the Muhammadan armies. These were extremely weedy and deficient in barrel, but would stand a great deal of work. A few stallions have always been maintained by Government; but the Silahdárs generally used to purchase their horses from private breeders, and their demand was the sole incentive to breeding. Of late years a hardy race of ponies has come into use for drawing the small two-wheeled conveyance called a *jutka*, which does duty for a native cab. The ponies are doubtless of Mahratta breed, and capable of great endurance. To improve the general breed of horses six superior stallions were obtained in 1889 from the Military Department and stationed at headquarters of Districts. The following year four fresh stallions and a pony mare were procured and the remaining Districts supplied. But so far the demand for their services has been rather limited.

A horse-breeding establishment is kept up by Government at Kunigal (removed there many years ago from Closepet) for supplying the Silahdárs with suitable mounts. In 1886 there were seven Arab stallions and one Australian; in 1891 the Arab stallions had risen to eight in number, and the Australian to three. During the intervening five years 271 foals were bred at the Stud, and, including stock of previous years, 246 were passed into the ranks. In addition to these, seventy were cast and sold as unfit or undersized, sixty-two died, and three were destroyed. The number remaining on hand in the Stud Farm in 1891 was 154.

Mules.—It is said that Tipu Sultan introduced some fine asses from Arabia for the purpose of breeding mules; but the prejudices of his subjects were so strong that nothing could be done. A private scheme

¹ Writing in 1803, Colonel Welsh says:—"Colar is so famous for a breed of vicious horses that all over the peninsula, whenever a horse turns out ill, he is called Colarie."

for a regular system of breeding these useful animals, so invaluable for transport, has been lately put before the Mysore Government for assistance, but nothing definite has so far been decided on.

Asses.—Every washerman keeps three or four females and a male. The superfluous males are sold to various kinds of petty traders, and people who transport salt and grain. The breed is very small, no pains being taken to improve it; nor indeed to keep it from growing worse. Some are of the usual ash-colour, whilst others are almost black, in which case the cross on their shoulder disappears. These are not varieties as to species; for black individuals have sometimes ash-coloured colts, and, on the contrary, black colts are sometimes produced by ash-coloured dams. The asses get nothing to eat except what in the intervals of labour they can pick up about the village. When the crop is on the ground they are tied up at night; but at other seasons they are allowed to roam about, and in order to prevent them from wandering too far their fore-feet are tied together. The males are never castrated, and the best are always sold off by the washermen, which are the principal causes of the degeneracy of the breed. At three years of age the females begin to breed, and some have every year a colt, while others breed once only in three years. An ass's burthen is reckoned about 76 lbs; with which they will daily travel about seven miles.

Horned Cattle.—The principal breeds of horned cattle in Mysore are the *Amrit Mahál*, *Mádésvaran Beṭṭa*, the *Kánkánhalli*, and the village cattle. Almost all other cattle seen in the country are importations or crosses between the above-mentioned breeds.

The *Amrit Mahál*,¹ literally Milk Department, is an establishment for the breeding of a race of cattle peculiar to the country of Mysore and famous for its utility for military purposes. The establishment was founded at some time during the Hindu government, with special privileges as regards grazing; but its maintenance for the special purpose of supplying draught cattle for artillery is due to Haidar Ali. He is reported to have introduced a breed of cattle from the Trichinopoly country, by a cross between which and the indigenous breed of Mysore was produced the *Hallikar* breed, which is considered the best in the whole establishment. Great doubt exists as to what the breed imported was, but general tradition points to the small Brahmani bulls, which to this day are noted for their endurance and fast trotting powers.

“It was this establishment,” wrote Sir Mark Cubbon, “which enabled

¹ The particulars are taken from a pamphlet containing the history of the *Amrit Mahál*, compiled from the Records of the Department by Captain M. A. Rowlandson, and one on Hunsur, by Dr. Gilchrist; with corrections by Major McInroy, the officer formerly in charge, to whom I was indebted for them.

Haidar Ali to march 100 miles in two days and a half to the relief of Chidambram, and after every defeat to draw off his guns in the face of his enemies ; which enabled Tipu Sultan to cross the peninsula in one month for the recovery of Bednur, and to march sixty-three miles in two days before General Medows ; which, in later times, enabled General Pritzler to march 346 miles in 25 days in pursuit of the Peshwa : and which enabled General Campbell, after the failure of his Bengal equipments, to advance upon Ava and bring the war to a favourable termination. It was also this establishment which enabled the Duke of Wellington to execute those movements of unexampled rapidity which are the admiration of every military man, and in consideration of whose services he recommended it to protection in a letter addressed at the close of the war to the Commander-in-Chief." Allusions in the Wellington Despatches show that the Great Duke often, during the Peninsular War in Spain, regretted that he had not the assistance of the Amrit Mahál cattle.

After the capture of Seringapatam, the Breeding establishment was intrusted to the native government, and the Public Cattle department to an agent ; but the inducements which had led Haidar and Tipu to keep up its efficiency were wanting, and by the end of 1813 the cattle had degenerated to such a degree that the management was taken over by the British, and 10,914 head of breeding cattle, the exact number made over to the Raja's government in 1800, received back. A Commissariat officer (Captain Harvey) was placed in charge, with a suitable establishment, and up to the 31st July, 1816, the number of cattle had increased to 14,399, exclusive of 900 calves transferred as fit for service. By 1823 the original number had nearly doubled itself, besides supplying for the public service young bullocks equal to one-fourth part of the increased establishment. In 1860, from motives of economy, Sir Charles Trevelyan ordered the establishment to be broken up, and the herds to be sold ; but the results were to the detriment of the public service. The Amrit Mahál was therefore, with the cordial approval and assistance of the then Maharaja, re-established in December 1867, with 5,935 head of cattle. In 1871 there were 9,800 head of all sizes, exclusive of 1,000 young male cattle in the Training Dépôt. It was arranged that a certain number of bulls should be handed over to the Mysore Government annually, to be stationed at various points in the country for the purpose of improving the breed of cattle used by the ryots.

The cattle were divided into 30 herds, containing from 200 to 700 head of cattle each ; for the grazing of which, 208 *káváls* or pasture grounds were allotted in various parts of the country.¹ They are divided into hot weather, wet weather and cold weather *káváls*, according to the seasons of the year during which they are of most use. The hot weather *káváls* are generally the beds of tanks in which grass springs up during the hot months, and near which there are trees for the purpose of affording shade to the cattle during

¹ Though a herd consists of both males and females of various ages, they are not allowed to graze in immediate company, each being divided into seven lots, called *páls*, to prevent their injuring one another. The average number of attendants or graziers is one to every fifty head of cattle.

the heat of the day. These are very valuable kávals, and are reserved as far as possible for the sole use of the Government cattle. The cold and wet weather kávals are those which during those seasons have plenty of grass and water, but which during the hot weather dry up and are of little use to the department; in both the latter descriptions of kávals the ryots' cattle are permitted to graze certain fixed portions, and after the Government cattle have left for their annual visit to the jungles, the *shervegárs* are permitted to sell some part of the grazing, and from the funds thus obtained the *kávalgárs* or guards are paid and other expenses met. This privilege ceases at the end of July each year.

The *Amrit Mahal* cattle comprise three varieties, called the Hallikár,¹ Hágálváđi and Chitáldroog, from the districts which originally produced them, and may be readily distinguished from every other breed in India by the peculiar shape and beauty of their heads and the symmetry of their form. They seldom attain an extraordinary height, but in proportion to their size are remarkably deep and wide in the chest, long and broad in the back, round in the barrel, well ribbed up and strong in the shoulder and limb.² They are active, fiery, and walk faster than troops; in a word, they seem to constitute a distinct species, and possess the same superiority over other bullocks, in every valuable quality, that thoroughbreds do over other horses. The cows of this breed are white, but the males have generally an admixture of blue over the fore and hind quarters. There is a fourth variety of coloured cattle, which are considered inferior to the white in energy and perseverance, though they rather surpass them in size. As the former breed is the most perfect that is known, it would only tend to its deterioration to cross it with any other, and the bulls are accordingly bred in the best herds, and individuals, selected from the best specimens, distributed to improve the breeds in the other herds.

A cow of this breed is supposed to give about one pukka seer of milk a day, and the calf could not be deprived of any part of it without

¹ An absurd legend is current among the herdsmen of the department regarding the origin of the *Hallikár*. They state that Haidar Ali, after one of his trips to the south, brought back to the Mysore country a number of cows of the small Brahmani caste. These cows were turned loose into a kával (in the Túm-kúr District) in which there were great numbers of antelope, and a cross between the big black bucks and the small Brahmani cows gave the present Hallikár breed. In support of the story they point to the small spot below the eye, common to antelope and to Hallikár cattle.

² The general characters of a good bullock are a round barrel, stout strong legs, and broad forehead. The average height is 48 inches, and 50 inches was about the highest standard. But the average height has very much increased since the re-establishment of the department in 1866. Some of the bullocks now run up to 53½ inches. Of course weight is also a material consideration. The average is about 12 maunds or 43 stone, but no means have been adopted to determine this exactly.

being materially injured in its growth. The calves remain with their mothers during the day, but are separated from them at night, and are kept in a fold under charge of the herdsmen until they are three months old, when they begin to graze and get strength. In the cold season, when the herbage is abundant, they are generally weaned at the age of five months ; but such as are brought forth later in the year cannot be separated from their mothers till after the hot weather. After separation, care is taken to conduct them to the richest pastures in the neighbourhood, and they are never supplied with any other food.

Heifers begin to breed between three and a half and four years old, and bring forth six or seven times. Twenty cows are allowed to one bull. The bulls begin to propagate at five years of age and retain their vigour till ten, when they are discarded from the herds. The average annual amount of births is fifty per cent on the number of cows, and the proportion of male and female calves is nearly equal.

The whole of the cattle, bulls, cows and calves subsist entirely on what the pastures afford, and on the stalks of the castor, *baller*, *kulti*, and other nourishing plants, which are left on the ground for their use after the harvest in the months of January, February and March. This brings them into excellent condition at the most favourable season for the cows taking the bull. In the dry weather, when a want of forage and water prevails in the open country, the herds are conducted to the south-western jungles, where the natural moisture of the soil, the early showers, and the shelter afforded by the trees are favourable to vegetation. They arrive there in May and return to their pastures in September, when the grass is in great abundance all over Mysore.

The calves are castrated in November, the cold weather being found peculiarly favourable to the success of the operation, and invariably between the age of five and twelve months, as their growth is supposed to be promoted by early castration ; and it is attended with this important advantage, that it prevents the cows being impregnated by inferior bulls and consequently prevents the breed from degenerating. They are separated from the herds after four years of age and transferred to the Public Cattle Department when turned of five, perfectly trained and fit for work. They arrive at their full strength at seven and are past their vigour at twelve ; they work till fourteen or fifteen, after which they decline rapidly and generally die at eighteen years of age. The cattle of these herds are kept in their wild state, without shelter of any description ; they are very fiery and cannot be approached by strangers without the protection of the herdsmen. It requires several months to break them in, and the employment is extremely difficult and dangerous.

At the age of three years the catching of bullocks takes place, previous to which they are nearly as wild as the inhabitants of the jungle. The bullocks are first driven into a large oval enclosure, which they are made to enter with much difficulty. This communicates with a square yard, surrounding an inner enclosure about twenty feet square, which is surrounded with a strong fence made of wooden posts placed close together and about twelve feet high. When they are collected in this, the opening is closed. The trainers then ascend on the top of the fence, and throw a noose round each of the bullock's horns. This done, the end of the rope is passed between posts near the ground, and the animal is drawn close up and secured by people on the outside. The passage is then opened and old trained bullocks admitted. One of the latter is bound by the neck to one of the wild animals, which being done, the rope is loosened, when he immediately endeavours to escape. His trained comrade, however, to whom he is coupled, restrains him, though but partially; accordingly the two leave the enclosure at tolerable speed. The rope by which the untrained bullock was originally noosed is allowed to remain attached to his horns, and when they approach one of the strong posts placed in the immediate vicinity of the enclosure the rope is quickly turned round it, by which the animals are again brought up. The untrained bullock is then well secured by the neck, with as little latitude of motion as possible. There he is kept alone for about two days, until he becomes considerably tamed and worn out with unceasing efforts to escape. The next operation consists in attaching to the animal a couple of blocks of wood so heavy as to be moved with some difficulty, and giving him as much liberty as this admits of. He is then admitted to the company of old trained cattle, and from the twofold effects of example and partial restraint he gradually becomes submissive. The bullocks are now grazed in the vicinity of Hunsur for a further period of three years, being tied up regularly each evening in lines. They are then transferred to the Public Cattle Department to undergo final breaking for the public service.

Since the Rendition the following changes have taken place:—On the 1st January, 1882, the Mysore Government purchased the Amrit Mahál cattle from the Madras Government, there being at that time 30 herds, with 12,502 head, of which 4,618 were cows and 177 breeding bulls. It was stipulated that the Department should supply the Madras Government for ten years with three-year-old bullocks at Rs. 50 per head, to a number not exceeding 400 annually. In 1886 this limit was reduced to 200 of four years old at the same price. The herds were therefore broken up in 1887 and their number reduced to sixteen. In 1889 steps were taken to form special herds of big and fine cattle. There are thus 23 herds now (1894) under six darogas. The steers are not caught near Hunsur, but in different kávals, and are accustomed to being tied up before being handed over to Madras. Others are sold at reduced rates or distributed to raiyats at suitable places. Each of the

darogas has also a sheep farm, where the country ewes are crossed by cross-bred Kashmir rams.

At the Hissar Cattle Farm in the Punjab, artillery cattle are bred from the Mysore cross to serve as "leaders." At the Bhadgaon Farm of the Bombay Government cattle-breeding has been established for over eleven years, the herd having taken its origin from the Mysore Amṛit Mahal. The main object has been to breed Mysore bulls for crossing and improving the cattle of the country around. "As I passed through the district, I saw evidence," writes Dr. Voelcker, "of the impress which the Mysore cattle reared at the Farm had made upon some of the other cattle, and how superior to the ordinary cattle were those which had the Mysore 'touch' in them."¹

Mádesvaran Beṭṭa—This breed comes from the jungles and hills near Biligirirangan Beṭṭa, on the south-eastern frontier of Mysore. They are larger than the Amṛit Mahál cattle, but are loosely made and not well ribbed up. They have heavy loose-hanging dewlaps, sloping broad foreheads, and large muzzles. They are very heavy slow animals, but crossed with a Hallikár bull they form excellent cattle for draught and ploughing. Of this cross-breed are the cattle mostly used by the large cart owners who carry on trade from towns in the Mysore territory to the Western Coast, Bellary and other places.

Kánkánhalli.—This breed comes from Kánkánhalli, in the south-east of Mysore; they are very like the Mádesvaran Beṭṭa breed, but are generally smaller, though larger than the Amṛit Mahál breed. They have thick horns, broad sloping foreheads, and white, very thick skins. In all other respects the remarks regarding the Mádesvaran Beṭṭa breed are applicable to the Kánkánhalli.

The *village cattle* vary very much in size, colour and characteristics; in some parts very fair cattle may be seen, but as a general rule the village cattle are a stunted inferior race. The cows generally give from half to one seer of milk per diem, though occasionally some may be met which give three seers, but it will be generally found that these have been fed on nutritious food, such as oil-cake, cotton-seed and such like. The bullocks are small, but for their size do a surprising amount of work.

Buffalo.²—Of the buffalo there are three varieties, the *Hullu*, the *Gaujri* or Gujarat, and the *Chokatu*, which comes from the country bordering on the river Krishna.

The *Hullu* is by far the most common, and is the native breed of the country. The female has a calf every year, and gives milk for seven

¹ *Report on the Improvement of Indian Agriculture, 204.*

² Much of the information in the following paragraphs is from Buchanan.

months. Besides what the calf draws from her, she gives twice a day about a quart of milk. She generally bears from ten to twelve calves, and is very unruly when the keeper attempts to milk her without the calf being present. They will convey a greater weight, either in a cart or on their back, than a common ox; but walk very slowly, do not endure heat, and cannot easily travel more than seven miles a day.

The two stranger breeds are greatly superior in size to the *Hulbi*; but in this country they very soon degenerate. The females breed once in two or three years only, and produce in all about six calves. For two years after each parturition they continue to give a large quantity of milk; but in the third year their milk begins to diminish; and it entirely ceases about two months before the time of calving. In this country, besides what the calf is allowed, they give daily from six to eight quarts of milk and require no more food than the common breed, neither do they refuse their milk should the calf be removed or die. The males are entirely reserved for breeding or for carrying loads; one of them will carry as much as six oxen, and will walk faster.

Sheep.—These are of three varieties, the *Kurubar* or ordinary breed, so called from the caste which rears it; the *Gollar*, which is less common and which owes its name to the same cause; and the *Yelaga*, which is the rarest of the three. White, brown and black colours are found in all three breeds. The *Kurubar* is a small sheep, with horns curling backwards. Both its flesh and wool are superior to those of the other two varieties. The *Gollar* is distinguished from the *Kurubar* by its large size, coarser wool, longer neck and different formation as to the head and jaws. The *Yelaga*, which is rare, is longer in the leg, and stands higher than the other breeds, but is less bulky and more resembles a goat in structure of the body and limbs. The sheep of this variety are never shorn of their wool, being too coarse for manufacture, and they shed their coats once a year. This is the breed which is used for draught and carriage of children. The *Gollar* sheep are left out at night at all seasons and in all weathers, and do not appear to suffer from the exposure, while the *Kurubars* and *Yelagas* are invariably housed at night. The different breeds are never mixed, chiefly owing to antagonism between the *Kurubar* and *Gollar* castes; but even in the absence of enmity between the shepherds it is doubtful whether the two varieties could ever be brought to mix, and it is pretty well established that the *Yelaga* will not amalgamate with the other two. They are solely dependent on pasturage, being never fed on grain.

Sheep, with the exception of the *Yelagas*, are shorn twice a year, and fifty fleeces amount to about a maund weight. The wool is all coarse,

and is made into rough kamblis. The shepherds usually hand over 100 fleeces to the weaver, who gives them in return a kambli. There was formerly a Government manufactory at Húnsúr, which turned out good blankets made from the wool of the white sheep in the Government farm. This has been abolished.

“The woolly breed of sheep, which exists throughout Mysore, is fairly esteemed,” says Dr. Shortt, “both for its mutton-forming and wool-producing qualities. The rams have large heavy horns, wrinkled and encircled outwards, and their points inwards and forwards. The head is large and heavy-looking, with a prominent Roman nose. The ears are of moderate size and pointed, and the tail short, never exceeding 3 to 4 inches. The ewes are mostly hornless. They are occasionally met with small light horns, seldom exceeding 3 to 4 inches in length. The prevailing colour is from a light to a very dark grey or black. The ram stands 25 inches, and the ewe 23 inches in height. The ordinary live weight is from 40 to 60 lbs., but gram-fed wethers attain from 60 to 80 lbs. They have fairly compact carcasses, with good width, prominence and depth of chest; the body is well woolled and rectangularly formed; in picked specimens the counter is full and the shoulder is fairly filled when in condition. The fleece never exceeds 3 to 4 lbs., and the staple averages 3 to 4 inches in length. An ordinary sheep fetches from 2 to 3 rupees in the market, fat wethers 7 to 10 rupees each.

“This breed furnishes the chief fighting rams of Southern India, for which purpose good picked male rams are sought after by native Rajas, Zamindars and others. They are much petted and pampered, till they grow quite savage; they will butt and also strike with their fore-feet; and I have also seen in one or two instances a propensity to bite. They are pitted against each other, and large sums of money staked on the result. In fighting, they run a tilt by first moving backwards some short distance to add force to the impulse of their weight; and frequently in the fight they have their heads or horns broken. These rams, from special selection and good feed, often attain 30 inches in height and over 80 lbs. in weight. Size does not necessarily ensure success in the battle, as I have seen the largest ram of the kind I remember ever having met with, run away after a few tilts from one that was very much smaller. All the breeds of sheep in Southern India are pugnacious and reared to fight, the preference always being given to the black woolly breeds of Mysore or to those of Coimbatore. This breed extends from Mysore to Bellary, where after a time the wool frequently changes into long lank hair.”

For many years Sir Mark Cubbon had an experimental sheep farm at

Heraganhalli, Nagamangala taluq, under the charge of a European Commissariat subordinate officer. Merino rams were imported yearly from Australia and the cross-breeds distributed all over the country. The breed of sheep throughout the Province was thus immensely improved both as to size, quality of mutton, and wool. The wool was sent in bales by the Mysore Government to England for sale, as well as for the purpose of being manufactured into blankets and serge. The farm was given up in 1863, as it did not pay expenses. This was owing apparently to sheep-breeding alone receiving attention: if other branches of farming had been combined, the results would probably have been more favourable.

In 1888 a flock of fifteen rams and ewes was imported from Australia with the view of improving the fleece of the country breed. A flock of white sheep and their lambs by an acclimatized merino ram had also been collected for breeding purposes. The lambs thus bred are larger and the fleece of the sheep much better than those of the ordinary sheep of the country. Some have been sent to Haidarabad and others sold or distributed to raiyats for breeding.

Goats.—There are two kinds of goats, the long-legged or *méke*, and the short-legged or *kanchi méke*, but the two can propagate together. In every flock of sheep there is commonly a proportion of 10 or 20 *méke* to 100 sheep. This does not interfere with the pasture of the sheep, for the goats live entirely on the leaves of bushes and trees. One male is kept for twenty females. Of those not wanted for breeding, the shepherd sacrifices some for his own use while they are young; the remainder he castrates and sells to the butcher. The female breeds at two years of age. They breed once a year, about four times, after which they are generally killed by the shepherds for their own use. For three months the kid is allowed the whole milk; afterwards the mother is milked once a day for two months; and eight goats will give a quart of milk. The excrement of both sheep and goats is much used for manure.

ETHNOGRAPHY

The aboriginal inhabitants of Mysore cannot probably be now traced with any degree of certainty, though remains of prehistoric races abound in stone monuments of different kinds, elsewhere described. On various scientific grounds India appears to have been originally part of a continent (to which the name Lemuria is sometimes given) stretching west to Africa and east to Cochinchina and Australia, of which Madagascar on the one side, and the islands included in Melanesia in the Indian Archipelago on the other, are some of the principal existing remains.¹ Of the primeval human races whose home it may have been, there survived (according to a theory of Professor Huxley's, developed by Professor Haeckel of Jena) two, namely, a woolly-haired and a smooth-haired. From the former sprang the Hottentots and negroes in Africa westwards and the Papuans of New Guinea eastwards; from the latter, represented perhaps by the natives of Australia, were derived the straight-haired and the curly-haired races. The first were the progenitors of the Malays of the islands in the Pacific Ocean, and of the Mongols of Eastern and Northern Asia, who penetrated on one side to Europe (their survivors being found in the Finns, Lapps, Magyars and Turks), on the other side to America, producing the Red Indians: the second peopled India and spread to South-western Asia, North Africa and the South of Europe. The original inhabitants of South India and Ceylon, distinguished as Dravidians (*homo Dravida*), may perhaps represent the least changed examples of the second branch. This hypothesis discredits the views at one time adopted, that the Dravidians migrated into India from the north-west, of which there is little evidence, the indications being held to be equally in favour of the opposite course.

Several of the Puranas² claim an Aryan descent for the southern races by making their progenitors or eponyms, Pándya, Karnáta, Chola

¹ "Throughout the later part of the palæozoic and the whole of the mesozoic era, there was a continuous stretch of dry land over what is now the Indian Ocean."
 "At the close of the cretaceous or commencement of the eocene period, the great Indo-African continent was finally broken up, and all but the remnants in India and South Africa sunk finally beneath the sea."—R. D. Oldham, *Geology of India*, pp. 211, 494.

² The Váyu, Matsya, Agni and Brahma Puranas.—Muir, *S. T.*, II., 422.

and Kerala, to be descendants of Dushyanta, the adopted son of Turvasu, who was the younger brother of Yadu, and a prince of the lunar line. Their father Yayāti, the son of Nahusha, gave the government of the south to Yadu, and that of the south-east to Turvasu, who is also said to have been the progenitor of the Yavanas.¹ Another account² substitutes Kola for Karnata. The former is a name which occurs extensively throughout India as the designation of a wide-spread aboriginal race. If the two therefore are interchangeable, it would seem as if the people of Karnata were considered identical with the Kols of the Central Provinces.³ The name appears in Kolar, after which the eastern District of Mysore is called, as well as in Kolála in the Týmkrú District.⁴

Though the Dravidians were certainly not Aryans, these statements may embody prehistorical myths. For analysis of such myths may be made to show that Turvasu was the name of a star-worshipping people, whose god (Akkadian *rasu*) was the meridian pole (*tur*), which stood for the Linga or Phallus, being evolved from the fire-drill and socket, its revolution amid the circumpolar stars of the Great Bear being considered the cause of the rains. They may be identified with the Zend Turanians (*an* signifying god in that language), and with the maritime traders called Tour-sha and Tur-sene or Tyrrhenians mentioned in Egyptian and Greek records. Their first great trading port was Dváraka in the peninsula of Kathiawar; other exporting harbours being Súrparaka (Surat) at the mouth of the Tapti, and Baragyza (Broach) at the mouth of the Narmada. They made settlements at the holy island of Dilmun (now Bahrein) in the Persian Gulf, and at Eridú, near the mouth of the Euphrates.

In course of time migration set the other way, and we meet with a race, also non-Aryan, who revered the moon (*sin*) and brought in

¹ Turvasu was also sentenced to rule over savages and barbarians—Mlechehhas, or people not Hindus . . . Manu, too, places the Dravidas amongst Mlechehhas; and these and similar passages indicate a period prior to the introduction of Hinduism into the south of India.—Wilson, *Vishnu Purana*, iv, 117. ² Harivamsa, Muir, *op. cit.*

³ The tribes driven out of the valley of the Ganges by the Aryans were almost certainly Kols to the south, and semi-Tibetans to the north.—Caldwell, *Gram. Drav. Lang.*, Int., 63.

⁴ The generally received theory is that the Kolarian tribes are relics of barbarians who entered India from the north-east at some very remote pre-historic period: they were subsequently, perhaps thousands of years ago, pushed aside by Turanian immigrants from Western Asia, who penetrated India from the north-west and filled the western and southern districts; at a later period the Aryans came into India, also from the north-west, settled in the Punjab, and eventually spread, first east and lastly south, into all parts of the Indian continent.

the year of thirteen lunar months. These were the Hus, Shus or Sus, the yellow race from the sources of the Tigris and Euphrates (and later of Shushan) who settled in the delta of the Indus—the Su-varna from whom Sindh was called Sindhu-Suvarna, part of Bengal Karna-Suvarna, and Gujarat and Kathiawar received the name of Sau-ráshtra. They correspond also with the Sabaræ of Ptolemy, the Suari of Pliny, and the Sauviras of Baudháyana. They were the great Sumerian and Vais'ya traders of Western Asia and India (if not China), the progenitors of the modern Saukars. Their capital was Pátála (Haidarabad in Sindh), then a seaport, though now 150 miles from the sea. They gave to the river its name Sindhu or Hindhu, which has come to designate the whole of India and its inhabitants. They are referred to as Yonas by Asoka and as Yavanas in the Mahabharata.¹

Dushyanta (previously mentioned) or Dushmanta, as he is also called, who was of the line of Puru but adopted by Turvasu, became the father, by Sakuntala, the heroine of Kalidasa's exquisite drama, of Bharata, after whom India was called Bhárata-varsha, or land of the Bháratas. These are represented by the Bars or Bhars, whose name is perhaps really derived from the Bar or banyan-tree (*ficus indica*), which they held sacred. They are an aboriginal race, classed among the Dravidians, and once ruled over a large area from the Central Provinces to Oudh and Behar. They are mentioned by Ptolemy as Barrhai, and may be the Sanskrit *barbara* or barbarians.² Besides Yadu and Turvasu, Yayáti had three sons, Druhyu, Anu and Puru. And the collective people of the five races who claimed to be descended from them were the Dravidian Bharatas under Vis'vamitra, who resisted the Aryan advance under Vasishtha, and whose defeat is celebrated in the seventh mandala of the Rig-veda.³

As regards Mysore, which is included in the Dravidian region, it seems not unlikely that the Tudas or Todas of the Nilgiris may be representatives of primeval tribes there settled. Not only is their

¹ See J. F. Hewitt's "The Ruling Races of Prehistoric Times," from which these particulars have been extracted, out of a bewildering maze of detail. "It was in this region (the Western Punjab) probably that they (the Aryans) found the first enemy of foreign race to themselves, for they mention hostile serpent-worshippers of a yellow complexion, and from other sources we learn that very early in history there had been movements amongst the light-tinted race of West-Central Asia, that went by the generic name of Skythian."—J. A. Baines, *General Report on the Census of India*, 1891, p. 122.

² See "The Original Inhabitants of Bhárata-varsha," by Dr. G. Oppert.

³ The story is told in Rig-veda, vii., 18, 33 (1-6) and 83, and in iii., 33.—Hewitt, p. 112.

language Old Canarese (modified apparently by the exigencies of their present location¹), but it is suggestive that they hold sacred the buffalo, from which animal Mahishūr (Mysore) derives its name. It might even be supposed that the legend of the conquest of Mahishāsura by Chámundi is based on an historical fact,—a victory gained over the minotaur ruler of the Mahisha maṇḍala, or buffalo kingdom, by adherents of one of the Saktis of Siva, in consequence of which the Tudas and other tribes were driven to take refuge in the mountains, but that its frequent occurrence as a subject of sculpture in other parts seems to indicate that the triumph was an event of wider and more national importance.

The Tudas have excited much interest as a race and as regards their origin. It was at one time held by some that they were Skythians, but it is now generally admitted that they are later arrivals than the race by whom the ancient monuments were constructed on which a Skythian descent was based.

In the next chapter, however, it will be seen that the ancient history of the country leads us back, as one of the earliest known events, to the conquest by the Haihayas, presumably a Skythian people, of Mahishmati or Mahesvara-pura (in the Central Provinces), and its subsequent recovery by the emperor Sagara, sprung from the ejected native race, who thenceforward imposed on the vanquished the stigma of shaving their heads in peculiar modes as a mark of subjection. Now not only do the Tudas (in common with other supposed aborigines) wear their hair unshorn, but it is worthy of note that they are acknowledged as lords of the soil by the Kotas, Baḍagas² and other tribes on the hills, also immigrants from Karnata,³ though of a later date, who pay them *gudu*, *kutu* or tribute; and that in virtue of this position the Tudas systematically abstain from all labour, unless milking their buffaloes can be described as such.

Another early if not aboriginal race are probably to be found in the

¹ The Tudas chiefly converse in the open air, calling to each other from one breezy hill top to another. Their speech sounds like Old Canarese spoken in the teeth of a gale of wind. . . . The language seems to have been originally Old Canarese and not a distinct dialect. The Tudas were probably immigrants from the Canarese country, and have dwelt on the Nilagiris for about 800 (? at least 1,800) years.—Dr. Pope, *Outlines of Tuda Gram.*

² The Baḍagas, northerners, are so called from *baḍaga*, the Kannada for north.

³ Kota may be considered as a very old and very rude dialect of the Canarese, which was carried thither (the Nilgiri hills) by a persecuted low-caste tribe at some very remote period. . . . The dialect spoken by the Burghers or Baḍagas (the northern people) is an ancient but organized dialect of Canarese.—Dr. Caldwell, *Gram. Draw. Lang.*, Intro., 37.

Hale Paika or Paiki, of the Nagár Malnad, and there are some curious coincidences between them and the Todas. Their name is said to be derived from *hale* and *páyika*, meaning Old Foot, as they furnished the foot-soldiers and body-guards of former rulers, to whom they were noted for their fidelity.¹ Considering the locality which they chiefly inhabit, we may conjecture that they formed some portion of the so-called monkey army which assisted Rama in his expedition against Ceylon. A nearly corresponding tribe on the coast north of Honavar is called Kumára Paika, the Junior Foot. There is a military tribe in Vizagapatam, called Paiks, who are said to be plainly aboriginal.² Also Paiks in Orissa, who call themselves sons of the squirrel, are classed among the first Turanian immigrants.³ The principal occupation now of the Hale Paiki is the extraction of toddy from the bhagni palm (*caryota urens*), the cultivation of rice land, and of kans or woods containing pepper vines; but they are described as still fond of fire-arms, brave, and great sportsmen. In Vastara and in Tuluva (S. Canara) they are called Bilvar or bowmen.⁴ In Manjarabad they are called Devara makkalu, God's children, which seems to support an aboriginal claim, and are *mande* and *gráma patels*.

Now it is not a little singular that Paiki is the name of the highest clan of the Todas, from which alone the *pálál* or priests are taken, and that the latter style themselves *Dér mokh*, *i.e.* Devara makkalu, or God's children. The *mande* of the Nilgiris corresponds with the *mande* of Manjarabad. The Todas, on account of their dark complexion, were supposed by Dr. Caldwell to have come from "the eastern or sun-burnt side of the range of Ghats." On the other hand "the similarity of some of their customs to those of the Malayárams and the position of their mands, which are mostly in the western uplands of the plateau, whilst some are even in the Wainád, seem to lend colour to the view that their country lay to the west of the Nilagiris." Whatever

¹ The derivation *hale páyika* is questionable. I have seen *hale páyaka*, which would mean "old drinkers," also given as the origin of the word. The occupation of toddy-drawing may have suggested the latter. And if the peculiarity which Colonel Marshall has remarked in the Todas, that they always keep step in walking—said to be very unusual even among trained sepoy when off duty—be common to the *hale paika*, it may have suggested the other.

² Maclean, p. 66.

³ Hewitt, p. 192.

⁴ In connection with the view of Ethiopian affinities in these races, it is curious to note that Heródotus in his account of the presents sent by Cambyses to the Ethiopians (III, 20-22) particularly mentions a *flask of date wine*, and that their king, though distrustful of the other things, was delighted beyond measure with the beverage when he was informed how it was obtained. Also that he sent the Persian king a singular *bow* in return. The bow figures in some remarkable rites among the Todas.

may have been the land of their origin, it seems more likely that "a race of drovers of semi-amphibious buffaloes gradually pushed forward its herds through the rich moist flats of Wainád to the grassy downs of the Nilagiris, than through the dry plains of Coimbatore and Salem."¹

Colonel Marshall, in his interesting work on the Todas, says:—"In the process of writing of them I have grown to the very strong conviction that the people are a surviving sample of some portion of the Turanian race when in its very primitive stage. Without much exercise of the imagination I can picture them the contemporaries and neighbours, even perhaps the ancestors, of races of south-western Asia which have made a figure in early history. There is much of the 'blameless Ethiopian' about them: something of the Jew and Chaldean in their appearance." In a note he adds:—"On the eve of sending this work to the press I would beg again to urge my belief in the connection between the Dravidian Toda and the Ethiop."²

Still keeping to the hills, we may probably set down the Kurubas of the south-western forests, and the Soligas of the Biligirirangan hills on the south-east, as aboriginal tribes. The Kurubas, or Kurumbas, as they are there called, extend to the Nilgiri hills, where the Badagas, who attribute to them great powers of sorcery, always at the time of ploughing employ a Kuruba to turn the first furrow, which may be emblematic of an ancient ownership in the soil, and a sort of acknowledgment that the Kuruba permits it to be cultivated. It is significant too that the Kurubas do not pay *gudu* or tribute to the Todas as the other tribes do.³

The Kádu or wild Kurubas of Mysore are divided into Beṭṭa or Hill Kurubas,⁴ a small and active race capable of enduring great fatigue, who are expert woodmen: and the Jénu or Honey Kurubas, said to be a darker and inferior race, who employ themselves in collecting honey and bees'-wax. Their villages or clusters of huts are called *háḍi*. Among their peculiar customs, a separate hut or *chávaḍi* is set apart in which the unmarried females of the háḍi sleep at night, and another at the other extremity of the háḍi for the unmarried males; both being under the supervision of the headman of the tribe. They are their own barbers, bits of broken glass doing duty for razors. Strangers are not allowed to enter a háḍi with shoes on. In cases of death, adults only are cremated; children are buried. The Beṭṭa

¹ Grigg's "Manual of the Nilagiri District," ch. ix.

² "A Phrenologist among the Todas," p. 4.

³ Brecks, "The Primitive Tribes and Monuments of the Nilagiris."

⁴ There are also subdivisions called Áne (elephant), Bévina (from *ḍévu*, the neem-tree), and Kolli (firebrand) Kurubas.

Kurubas worship forest deities called Nóráli and Mástamma, and are said to be revengeful, but if treated kindly will do willing service. The Jénu Kurubas never own or cultivate land for themselves, nor keep live-stock of their own. Both classes are expert in tracking wild animals, as well as skilful in eluding pursuit by wild animals accidentally encountered. Their children when over two years old move about freely in the jungle.¹

The Irujiga of the forest tracts in the eastern Districts, seem to be another tribe closely resembling the Jénu Kurubas, and engaged in the same pursuits. Their name is said to be derived from *irul*, night, indicating the blackness of their hue. Buchanan mentions that they called themselves Chensu, the name of well-known wild tribes in the Madras country. The Soligas are a very secluded race. They speak Old Canarese, and are remarkable for their keenness of sight, and skill in tracking wild animals. The tribes of Hasulas and Maleyas, who somewhat resemble them, are met with along the Ghats on the western frontier. But these appear to be immigrants from South Canara, and speak Tulu. They collect cardamoms and other wild products for their employers, whose agrestic slaves they have virtually become. They live in small isolated huts, which, in the case of the Hasulas, are provided not only with the usual principal entrance by which to crawl in, but also with a half-concealed hole in the rear, through which the shy inmates steal out into the jungle at the merest suspicion of danger or on the approach of a stranger. Their religion seems to be devil-worship. When a person dies, his spirit is supposed to have been stolen by some one else's devil, who is pointed out by the astrologer after divination by throwing cowries or rice. The heir or relation of the deceased then redeems the spirit by offering a pig, fowl or other gift, and it is caused to take up its abode in a pot, which is periodically supplied with water and nourishment.²

The Korachas, Koramas, or Koravas, a numerous wandering tribe, who carry salt and grain from one market to another by means of large droves of cattle and asses, and also employ themselves in making bamboo mats and baskets, appear to have an affinity with aboriginal or early naturalized tribes. The mode in which the men wear their hair, gathered up into a large knot or bunch on one side of the top of the head, exactly resembles what we see in the sculptured figures on various stone monuments. The women, again, may be known by numerous strings of small red and white glass beads and shells worn round the neck and falling over the bosom. In the depths of the forest they are

¹ Report on the Mysore Census of 1891, pp. 226 ff.

² *Ib.* p. 230.

even said to dispense with more substantial covering. This also accords with the ancient practice illustrated in numerous bas-reliefs. For women, as there represented, are commonly arrayed in nothing more than rows of ornamental chains and jewellery, pendent from the throat and loins—an attire, if such it may be called, worthy of the Age of Innocence ; and becoming enough, it may be, on the golden-olive and nut-brown tints, that scarce reveal a blush, of Nature's vesture for the fair of these climes.

The Koravas in Chutia Nagpur are described as Kolarians,¹ and such those in Mysore may be by origin. They are here credited with strong thieving propensities. One section is called Dabbe (split bamboo), and consists no doubt specially of mat-makers. It would appear as if some reminiscence of a custom like *couvade* lingered among the Koravas, for it is said that when a woman is confined, her husband takes medicine for her.² They live in small camps of movable wicker huts, which are sometimes stationary for a time near large towns, but are often removed from place to place daily.

Descending to the interior, we find an out-caste race, the Holayas, whose name may be derived from *hola*, a field,³ occupying a quarter of their own, called the *Hola-géri*, outside every village boundary hedge. They are the *Chandála* of Sanskrit writers ; and are the representatives of the *Bala-gai* or right-hand faction, of which an account will be found further on. "As a body they are the servants of the ryots, and are mainly engaged in tending the plough and watching the herds. But one of this despised order is generally the priest to the village goddess, and as such, on that annual day when all hasten to pay their offerings at her shrine, takes precedence of the twice-born Brahman."⁴

The *tofi* or *kuḷavāḍi* (he who directs the ryots), always a Holaya, is a recognized and indispensable member of every village corporation. In his official position he is the village policeman, the beadle of the village community, the headman's henchman ; but in the rights and

¹ Hewitt, p. 47. "The old traditions make no distinction between the dark races, if indeed there were any. Philology indicates a fairly well-marked distinction between the languages of the tribes of the central belt, and groups one section, mainly that to the southward, under the head of Dravidian, and the other under a title which has remained, for want of a better, in its primitive and not very correct form of Kolarian. Physiology, however, has been busy amongst these tribes, and discovers no trace of distinction between the two groups."—Baines, p. 123.

² Mys. Cen. Rep., p. 226.

³ But the Brahmans call them Holeyas, which they derive from *hole*, impure.

⁴ This and following particulars are taken from a paper by Captain Mackenzie on the "Kuḷavāḍi of the Hassan District."—*Ind. Ant.*, II., 65.

privileges which yet cling to him we get glimpses of his former estate, and find proofs that the Holayar were the first to establish villages. All the castes unhesitatingly admit that the kuḷavāḍi is (*de jure*) the owner of the village. If there is a dispute as to the village boundaries, the kuḷavāḍi is the only one competent to take the oath as to how the boundary ought to run, and to this day a village boundary dispute is often decided by this one fact—if the kuḷavāḍis agree, the other inhabitants of the village can say no more. Formerly, when a village was first established, a large stone, called *karu kallu*, was set up within it. To such stones the patel once a year makes an offering, but the kuḷavāḍi, after the ceremony is over, is entitled to carry off the rice, &c., offered, and in cases where there is no patel, the kuḷavāḍi performs the ceremony.

But what seems to prove strongly that the Holaya was the first to take possession of the soil is, that the kuḷavāḍi receives, and is entitled to receive, from the friends of any person who dies in the village a certain burial fee, or, as it is forcibly put, "they buy from him the ground for the dead." This fee is still called in Canarese *nela hāga*.¹ In Manjarabad, the ancient Balam, the kuḷavāḍi does not receive this fee from those ryots who are related to the headman. Here the kuḷavāḍi occupies a higher position; he has in fact been adopted into the patel's family, for on a death occurring in such family the kuḷavāḍi goes into mourning by shaving his head. He always receives from the friends the cloths the deceased wore, and a brass basin.

The kuḷavāḍi, however, has to pay an annual tax, consisting of one fowl, one haṇa (4 annas 8 pie), and a handful of rice, to the agent of the Suḍugāḍu Sidḍa or lord of the burning grounds, who resides somewhere in the Baba Budan hills and is of the Gangaḍikāra Wokkaliga caste.

Traditions, whose authenticity there seems no reason to doubt, are preserved, as elsewhere related, of an early Jain immigration, perhaps in the 4th century B.C., from Ujjayini and the north; also of the introduction in the 3rd or 4th century A.D. of Brahmans, the progenitors of the Haiga or Havika Brahmans of the Nagar country, from Ahichchhatra in Pānchāla or Rohilkhand, by one of the Kadamba kings; ² of the attempt of the king of the Chandalas above the Ghats to

¹ From *nela*, the ground, and *hāga*, a small coin (worth one anna two pie).

² The Haiga Brahmans seem to be of pure race and of no bastard or doubtful caste. They are described as very fair, with large eyes and aquiline noses, a description which would imply for them a derivation from an uncorrupted and little intermixed northern source.—Campbell, *Ethnol. India*, 74.

form a matrimonial alliance with a Kadamba princess, his consequent death by treachery and the loss of his kingdom, into which the Brahmans under the new rulers gained admission. In the south we have evidence that in the 3rd and 4th centuries the Ganga kings were extending their sway over Mysore, and this seems to have been accompanied by a gradual setting aside of the predominant Jain influence by that of Brahmans. The Chola invasions of the 11th century introduced a large Tamil influence. In the east and north, we may suppose that under the Mauryas and the Pallavas, up to the 6th century, Buddhistic influences would be chiefly at work, and settlers from the Telugu countries attracted into Mysore. The progress of events as related in the next chapter will suggest the circumstances under which the population was probably recruited by Kongas, Reddis, Woddas and other tribes.

As far back as the 10th century we find two great territorial divisions, namely, Gangaváḍi, occupying the southern and central parts of the country, and Nonambaváḍi the northern. The correspondence of names shows that in the Gangaḍikára and Nonaba Wokkaliga, who form, especially the first, so large a proportion of the agricultural class, we have the descendants of the subjects of those provinces. The advent of Muhammadan and Mahratta immigrants can without much difficulty be assigned to the right time, and that of Europeans is well known. The vicissitudes through which the country has passed will prepare us to find a great admixture of castes and people. Accordingly, no fewer than 112 different names of castes and 382 recognized subdivisions occur in the last Census Report for 1891. The number of subdivisions actually returned, however, is stated to have been no less than 864.

POPULATION

The first census was taken in 1840-1 and the next in 1851-2, since which period annual returns were made up until 1871, when a census more minute and exact was carried out. The latter indeed may probably be considered the only real census obtained by actual enumeration of the people; the older *kháneshumári* estimates having been generally formed, it is believed, by multiplying the ascertained number of families by a figure assumed to be the average number of members composing each. Nevertheless the figures, so far as any are available, are not without interest.

Year.	Hindus.	Muhammadans.	Others.	Total.
1801	...	...	...	1,969,493
1804	2,094,359	77,395	...	2,171,754 ¹
1832	...	...	...	3,500,000 ²
1841	...	...	...	3,050,713
1851	...	...	...	3,426,458
1852	...	...	...	3,460,696
1854	...	...	...	3,501,283
1855	...	...	...	3,535,441
1856	3,476,966	152,611	...	3,629,577
1857	3,447,944	161,160	...	3,609,104 ³
1858	3,557,110	181,817	...	3,738,927
1859	3,621,723 ⁴	200,500 ⁴	...	3,822,223
1860	...	...	...	3,821,000
1863	...	...	...	3,872,209
1864	...	...	...	3,895,687
1865	...	...	...	4,013,601
1866	...	...	...	3,915,721
1867	3,724,178	172,255	14,302	3,910,735
1868	...	...	...	3,909,121
1869	3,793,973	182,654	29,713	4,006,340
1870	3,839,679	189,272	27,815	4,108,607

} Famine
years.

The results of the regular census of 1871 showed that the population must have been under-estimated in the previous valuations.⁵ But so far as these afford any data for calculation, the rate of increase in the decade 1841-1851 was 12·3 per cent; in the 9 years 1851-1860 the rate was 11·5 per cent; and in the decade 1860-1870 it was 7·5 per cent.

¹ Excluding Balam and the recently interchanged districts, the number was 202,261. A considerable migration took place from the districts allotted to the Nizam into Dodballapur and that neighbourhood, but nearly the whole of these persons gradually returned after the cession of those provinces to the Company. Many families which had emigrated to Baramahal in 1792, when it was ceded to the Company, now returned to Mysore. About 200,000 persons also emigrated temporarily from the Mahratta country into Mysore, to escape from the famine which prevailed there.

² This is printed in the report as 4,500,000, a total which seems so manifestly wrong that I have taken the liberty of altering the first figure.

³ The decrease is explained as due to the omission of the island of Seringapatam.

⁴ Approximate.

⁵ Writing in 1804, Col. Wilks has the following remarks on the estimate of population at that period:—"I am induced to suspect some error in one of the computations, notwithstanding the frequency in Mysore of that most fatal source of depopulation, the presence of a Mahratta army. The usurpation of Haidar Ali may be considered as complete in 1760; at that time many of the districts were permanently occupied by Mahratta troops. Gopal Rao Hari invaded Mysore in the same year. It was again invaded by Bani Visaji Pandit in 1761; by Madhu Rao in 1765, 1767 and 1770; by Tryambak Rao in 1771; by Raghunatha Rao in 1774; by Hari Pant Purkia in 1776 and 1786; and lately I have investigated on the spot and examined

CENSUS TOTALS

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The following table shows the total male and female population, and the total in each District, as found by the census of 1871, compared with the numbers of the previous estimate :—

District. ¹	Estimated Population of 1869-1870.			Actual Number as per General Census of 1871.			Increase per cent.
	Males.	Females.	Total.	Males.	Females.	Total.	
Bangalore ...	356,241	303,162	659,403	414,543	413,811	828,354	25·6
Kolar ...	274,859	251,601	526,460	309,685	309,269	618,954	17·6
Tumkūr ...	251,029	245,034	496,063	315,440	316,799	632,239	27·5
Mysore ...	400,537	362,922	763,459	467,562	475,625	943,187	30·7
Hassan ...	320,373	272,428	592,801	328,324	340,093	668,417	12·8
Shimoga ...	234,167	196,053	430,220	258,446	240,530	498,976	16·0
Kadur ...	137,593	124,229	261,822	170,337	163,588	333,925	27·6
Chitaldroog ...	203,069	175,310	378,379	271,587	259,773	531,360	40·4
Total ...	2,177,868	1,930,739	4,108,607	2,535,924	2,519,488	5,055,412	23·0

Since the general census of November 1871 a general census has been taken on two occasions, one on the night of the 17th February 1881, and the other on the night of the 26th February 1891, synchronous with the general census of all India on those dates. The results of the three may be exhibited as follows :—

Year.	Males.	Females.	Total.	Difference per cent.	No. per square mile.
1871	2,535,924	2,519,488	5,055,412	...	172·5
1881	2,085,842	2,100,346	4,186,188	- 17·19	142·8
1891	2,483,451	2,460,153	4,943,604	+ 18·09	168·6

the traces of the merciless ravages committed in 1791 and 1792 by Parasuram Bhao. In consequence of these incessant calamities, many districts formerly well-peopled do not exhibit the vestige of a human being ; and Chitaldroog District in particular may be considered as deprived of the great mass of its inhabitants.

The word *vails*² is applied to the inhabitants of a district who, deserting their homes on the approach of a hostile predatory force such as that of the Mahrattas, migrate *en masse* to another part of the country or to inaccessible woods and hills until the departure of the enemy. And no testimony could be more emphatic to a state of habitual misery than the existence, in all the languages of the south, of this single term to describe what cannot be expressed in any European language but by a long circumlocution.”

¹ The limits of the several Districts have been subject to alterations since, and do not therefore exactly coincide with the existing limits, though the names are the same.

ETHNOGRAPHY

The decrease which took place in the decennial period 1871 to 1881 was due to the great famine of 1877 and 1878. (The present population is somewhat greater than that of Ireland—4,704,750 in 1891.)

The distribution of the population by districts is as follows :—

District.	Approximate Area.	Males.	Females.	Total.	No. per square mile.	Percentage to total.
Bangalore ...	3,081	399,486	403,508	802,994	260	16·24
Kolar ...	3,433	297,655	293,375	591,030	175	11·96
Túmkúr ...	4,367	291,133	289,653	580,786	133	11·75
Mysore ...	5,078	580,737	601,077	1,181,814	232	23·90
Hassan ...	2,603	255,044	259,908	514,952	197	10·42
Shimoga ...	4,048	275,884	252,097	527,981	130	10·68
Kadur ...	2,685	173,922	156,141	330,063	123	6·67
Chitaldroog...	4,010	209,590	204,394	413,984	103	8·38

The classification of the people according to the main heads of religious belief gives the following results :—

Class.	Males.	Females.	Total.	Percentage.
Hindus	2,324,499	2,314,605	4,639,104	93·84
Jains	7,116	6,162	13,278	·27
Muhammadans	131,473	121,500	252,973	5·11
Christians	20,306	17,829	38,135	·77
Others (Parsi, Sikh, Brahmo)	57	57	114	...
Total	2,483,451	2,460,153	4,943,604	

Compared with the similar table for 1871 it appears that Hindus have diminished by 1·25 per cent., while Muhammadans have increased by ·98, and Christians by ·27, which together exactly make up the difference. It should however be taken into account that the total population in the same period fell by 2·5 per cent.

Hindus.—Under the term Hindu have been included all natives of this part of India who do not properly come under one of the other headings. The Hindus are nominally divided into four castes, which are entirely separate from each other, and between whom no connection by marriage or otherwise is permitted. The distinction is complete in every sense, hereditary and personal, and it is impossible for any member of these castes to be other than what his birth made him, unless indeed he should transgress some law binding on his particular caste beyond the possibility of pardon or expiation. In such a case the

punishment is expulsion from the community or loss of caste, when the unfortunate individual becomes contemptible in the eyes of all, and his place henceforth is amongst the lowest Pariahs, the dregs of Hindu society. Even the most despised caste would decline to admit him on terms of social equality, even though he had been originally one of the heaven-born Brahmans. The first or highest caste is the Brahman or priestly class ; the second the Kshatriya or military class ; the third is the Vaisya class, composed of husbandmen and merchants ; and the fourth is that of the Súdras, and comprehends artisans, labourers and agriculturists.¹ Besides these there are many castes unrecognized by the four grand divisions, whose manners and customs are governed by laws of their own, and who are as exclusive in their way as any of the four above mentioned.

Caste,² originally called *varṇa*, colour, but now more usually *jāti*, birth, was doubtless at first a distinction of race based on difference of complexion, and intended to prevent degeneration from intermixture of the fair-skinned Aryan conquerors with the dark-skinned earlier settlers, or the black aboriginal tribes. The tradition of the common origin of the four pure castes or tribes from the head, arms, thighs, and feet of Brahma, points to them collectively as forming eventually one nation, each class distinguished from the others by reason of its occupation, which was probably hereditary. But numerous other mixed castes were always found among the great body of the population. The statements in Manu suffice to show that endless ramifications had taken place in his time through intermarriages of different castes, and he assigns separate names to an enormous number of new castes that sprang from these connections. "Indeed, it is evident that some of the lowest castes, perhaps many, were in part derived from the highest," says Mr. Sherring, who also writes :—"Had the creation of new castes continued to be made in succeeding ages with the same ease and rapidity as they were in these earlier times, it is plain that the caste system would have destroyed itself, in two ways,—first, by the multiplication of new castes throughout the land, and, secondly, by the intermarriages of all the castes. The increased strictures imposed upon the castes, especially upon the primary ones, and the prohibition of irregular marriages—that is, of marriages of members of one caste with

¹ Strong opposition was manifested on the part of certain classes in the census of 1891 to be graded among Súdras, accompanied with strenuous efforts to be included among Brahmans.

² From *casta*, Portuguese for race or breed. According to a passage in the Maha Bharata, the colour of Brahmans is white, of Kshatriyas red, of Vaisyas yellow, of Súdras black.

members of another,—gave in later years strength and vitality to a system which otherwise must soon have become extinguished. At what epoch this fundamental change in its constitution was made is not known.”¹

In Mysore the various castes are probably as numerous as in any other part of India of equal extent. The natives of the Province, by a fanciful arrangement, recognize 101 as the limit to the total number, but in the enumerators' forms of the recent census it was found that 864 castes had been returned, more than double the number given in 1871. Some of these, though returned in different localities under different names, doubtless belonged originally to the same stock. A few families or individuals probably separated from the main body, and having removed to another part of the country, either adopted a new name or were given one by their neighbours. There is every reason to believe that in some similar manner the number of castes is even now constantly increasing. Disputes arise, and the caste divides into two factions, each headed by some influential man or family; they refuse to associate with each other or to intermarry, and unless in a short time some common interest compels the parties to re-unite, a separate caste or sub-division is permanently formed, which adopts some peculiarity of its own to distinguish it from the original.

The agricultural, artisan and trading communities are termed *pañas* or professions, which are eighteen in number. These *pañas* are divided into two factions, called Bala-gai and Yeḍa-gai, or right and left hands. A large number of castes belong to one or other of these divisions. All Brahmans, Kshatriyas, and most of the Súdras are considered neutral. Although the right- and left-hand factions are said to include only eighteen trades, there are many castes which adhere to one side or the other, but their numbers do not seem to be taken into account.

The following are the castes composing the two factions :—

<i>Right-hand Faction.</i>			<i>Left-hand Faction.</i>	
Bañajiga ...	... Traders.		Páñchála, comprising :—	
Wokkaliga ...	... Cultivators.		Baḍagi ...	... Carpenters.
Gañiga ...	... Oilmen who yoke only one bullock to the mill.		Kanchugára ...	... Copper or brass smiths.
Rangáre ..	... Dyers.		Kammára ...	... Iron smiths.
Láḍa ...	... Mahratta traders.		Kal-kuṭiga ...	... Stone-masons, and
Gujarátí ...	... Gujarát merchants.		Akasále... ..	... Goldsmiths.

¹ *Hindu Tribes and Castes*, Intro. xvii. Gôtamīputra Satakarni, who reigned in the second century, is said, in an inscription at Nāsik, to have prevented the mixing of the four castes (*varna*).—*Arch. Surv. W. Ind.*, iv., 109.

Kámáti	Labourers.	Bhéri	A class of Nagarta traders.
Jaina	Jain traders.	Dévánga	Weavers.
Kuruba	Shepherds.	Heggániga	Oilmen who yoke two bullocks to the mill.
Kumbára	Potters.	Golla or Dhanapála	Cowherds who transport money.
Agasa	Washermen.	Béda	Hunters.
Besta	Fishermen or Palanquin bearers.	Yákula	Cultivators.
Padmasále	A class of weavers.	Pałli or Tigala	Market gardeners.
Náyinda	Barbers.	Mádiga, the lowest left-hand caste.	
Uppára	Salt-makers.		
Chitragára	Painters.		
Golla	Cowherds.		
Holeya, the lowest right-hand caste.			

The Baṇajigas and Línga Baṇajigas are the foremen of the right-hand faction. They say that all the eighteen *pañas* or professions enumerated above belong to them, and that the nine *pañas* of the left-hand are separate. The Pánchálas and Nagartas, who are at the head of the left-hand faction, contend that the eighteen *pañas* are equally divided between the two factions, and that the nine above enumerated belong to them. In the main it is evidently a struggle for precedence between the artisans and the traders, or between followers of the old-established handicrafts and innovators who brought in the exchange of commodities with other parts, supported by producers and ministers to luxury. It has been found impossible to obtain a uniform, authentic, and complete list of the castes composing each faction, but the statement above is only doubtful in the case of one or two of the intermediate castes, and perhaps Komatis should take the place of Jains, and Toreya that of Yákula. The works referred to as authorities are *Sahyádrí Khandá* and *Ellés'a-vijaya*, both said to be of the time of the rise of Vijayanagur in the fourteenth century, but the information has not been found in the former, and the latter work is not forthcoming.

The origin of the distinction between the two divisions is founded on fable,¹ and is said to have taken place at Conjeveram, where the goddess Káli placed certain castes on her right hand and others on her left. The two parties have ever since disputed as to the relative honour accorded to each side. The division appears to be of comparatively modern origin, as no mention of it has been found in any ancient work.² It is, moreover, confined entirely to the south of India. Each

¹ There is also a right- and left-hand division of Sakti worshippers, the rites of the former being principally magical, of the latter bloody and licentious. But there seems to be no connection between the cases.

² There is indeed a doubtful passage in the *Mahawanso* which may be supposed to refer to it, and if so, the institution would seem to be of great antiquity. When the Pándya princess was sent from Madura to Ceylon, in response to an embassy from

party insists on its exclusive rights to certain privileges on all public festivals and ceremonies, and it not unfrequently happens that one side usurps the supposed and jealously guarded rights of the other. On such occasions a faction fight is almost sure to ensue. Cases are recorded where the carrying of an umbrella, or wearing particular coloured flowers in the turban, has given rise to severe outbreaks accompanied by bloodshed. The opposition between the two divisions is still kept up, but apparently not with the same bitterness as in former times. In fact some of the castes seem in the late census to have been averse to own themselves as belonging to either hand, preferring to admit adhesion only to the eighteen paṇa or the nine paṇa, while over 100,000 made no return at all in the matter. The figures actually obtained were, 1,693,461 as belonging to the eighteen paṇa (the right-hand), and 503,439 as belonging to the nine paṇa (the left-hand).

The right-hand claim the exclusive privilege of having twelve pillars in the *pandal* or shed under which their marriage ceremonies are performed (allowing to the left only eleven); of riding on horseback in processions, and of carrying a flag painted with the figure of Hanumān.¹

The two factions are also styled Désa and Péte (in some places Náḍu). The reason given is that Linga Banajigas, who are at the head of the right-hand division, not being original natives of the place, were called Désavalas or outsiders, and the others Péte or Náḍuvalas.

In the recent census of 1891 the old caste gradation has been set aside in favour of classifications according to occupation, and, as regards Hindus, according to the numerical importance of the castes. The results of the former are given under the following prescribed heads:—

Class of Occupation				Numbers	Percentage
A	Agricultural	...	...	1,665,442	33·69
B	Professional	...	...	290,704	5·88
C	Commercial	...	...	470,570	9·52
D	Artisan and Village menial	...	...	1,877,941	37·99
E	Vagrant minor Artisans and Performers, &c.	...	...	344,055	6·96
	Races and nationalities	...	...	291,168	5·89
	Others, not stated	...	...	3,724	0·07

The following is a different return of occupations based on sources of livelihood. Of the total number set down as thus supporting themselves the actual workers or bread-winners form only 34·27 per cent., the remainder being dependants, chiefly women and children:—

king Vijaya soliciting her hand in marriage, she is said (according to one version) to have been accompanied by a thousand members of the eighteen castes and five different classes of workmen.

¹ For caste insignia, see *Ind. Ant.* iv, 345.

OCCUPATIONS

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Class of Occupation	Males	Females	Total	Percentage
Government...	122,327	113,838	236,165	4.77
Pasture and Agriculture...	1,685,445	1,630,558	3,316,003	67.07
Personal service ...	55,182	54,157	109,339	2.21
Preparation of material substances.	221,819	212,610	434,429	8.78
Commerce, Transport and Storage ...	90,094	87,284	177,378	3.58
Professions ...	40,187	39,825	80,012	1.61
Indefinite and Independent ...	268,397	321,881	590,278	11.92

Analysis of the preceding table into the various prescribed orders supplies the following further information. The actual number of separate occupations is 634. To the percentage of each on the population of the State has been added, for comparison, the percentage of similar occupations in British India :—

	Total	Percentage in Mysore	Percentage in India		Total	Percentage in Mysore	Percentage in India
Government—				Metals and Precious			
Administration...	213,751	4.32	1.95	Stones ...	73,602	1.49	1.33
Defence ...	22,233	0.45	0.23	Glass and Earthenware ...	27,421	0.55	0.82
Service of other States	181	,,	0.18	Wood and Cane ...	33,177	0.67	1.50
Pasture and Agriculture—				Gums, Drugs and Dyes	2,843	0.06	0.14
Live Stock	23,106	0.47	1.27	Leather ...	24,459	0.49	1.14
Agriculture	3,292,897	66.61	59.79	Commerce, Transport and Storage—			
Personal Service—				Commerce	160,967	3.26	1.63
Domestic & Sanitary ...	109,339	2.21	3.91	Transport and Storage	16,411	0.33	1.38
Preparation of Materials—				Professions—			
Food and Drink ..	62,819	1.27	5.07	Learned and Artistic ...	76,980	1.56	1.97
Light and Fuel ...	23,188	0.47	1.23	Sport and Amusements ...	3,032	0.06	0.05
Buildings ...	30,508	0.62	0.50	Indefinite and Independent—			
Vehicles and Vessels ...	862	0.02	0.05	Unskilled Labour ...	493,578	9.99	8.87
Supplementary articles	10,057	0.20	0.40	Undefined	2,826	0.06	0.54
Textile Fabrics and Dress ...	145,493	2.94	4.39	Independent of work ...	93,774	1.90	1.66

A supplementary table shows the numbers of those who combine with their hereditary occupations a certain amount of land cultivation :—

	No	Per cent		No	Per cent
Government ...	8,333	24·7	Commerce	2,138	6·1
Pasture and Agri- culture	317	1·0	Professions	1,706	4·8
Personal service ...	3,583	10·6	Indefinite and Inde- pendent... ..	4,657	13·9
Preparation of ma- terials	13,100	38·9	Total ...	33,834	

The classification of the main Hindu castes according to numerical strength yields the following results, the percentage to the total population being also shown in the case of those above 100,000. The capital letters indicate the class of occupation as contained in the first table above :—

Over 100,000.

Wokkaliga A ...	1,341,849	27·14	Beḍa ... E ...	217,128	4·39
Holeya ... D ...	520,493	10·51	Bráhmaṇa B ...	183,541	3·71
Lingáyita A B C .	483,159	9·77	Golla ... D ...	128,995	2·60
Kuruba ... D ...	349,037	7·06	Banajiga ... C ..	114,735	2·32
Mádiga D ..	239,575	4·84	Wodda ... E ...	107,203	2·16

50,000 to 100,000.

Besta D ...	99,897	Neyigára D ...	86,986
Akkasále D ...	98,181	Agasa D* ...	85,671
Uppára D ...	89,123	Tigala A ...	56,710

20,000 to 50,000.

Maráta... .. A ...	44,446	Gáñiga D ...	35,808
Kumbára D ...	40,809	Komaṭi C ...	29,054
I'ḍiga D ...	39,937	Koracha A ..	24,494
Lambáñi A ...	39,137	Nagarta C ...	22,964
Náyinda D ...	37,296	Kshatriya A ...	21,795

10,000 to 20,000.

Sátáni B ...	19,987	Darji D ...	10,664
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5,000 to 10,000.

Ráchevár ... A B D E ...	9,554	Naṭuva B ...	7,476
Jógi E ...	9,410	Kammára D ...	6,250
Baḍagi D ...	8,646	Mudali C ...	5,437

1,000 to 5,000.

Méda E ...	4,261	Bhaṭ Ráju B ...	1,388
Domba E ...	2,500	Dásari B ...	1,178
Láda C ...	2,045	Iruliga B ...	1,156
Góniga D ..	1,426	Buḍabuḍike... .. E ...	1,092

Below 1,000.

Garudiga E ... 876	Gujarati C ... 71
Móchi... .. D ... 746	Sudugáduisidda ... E ... 46
Sannyási... .. B ... 684	Baniya C ... 41
Pille A ... 559	Gondaliga E ... 29
Gosáyi B ... 424	Márváđi C ... 21
Kanchugára ... D ... 396	Pandáram E ... 15
Jalagára D ... 258	Uriya A ... 8
Bairági B ... 222	Karma E ... 7
Monđa E ... 189	Káyast B ... 6
Náyar... .. A ... 117	Sániyar E ... 3
Kanakkan B .. 108	Multáni C ... 2
Sillekyáta E ... 93	Ját C .. 1

The totals of these groups may be thus stated, showing the number of castes under each and the percentage to the total Hindu population:—

	Total	Per cent
10 castes of over 100,000	3,685,715	79.50
6 „ 50,000 to 100,000	516,568	11.13
10 „ 20,000 to 50,000	335,740	7.24
2 „ 10,000 to 20,000	30,651	0.66
6 „ 5,000 to 10,000	46,773	1.00
8 „ 1,000 to 5,000	15,047	0.32
24 „ below 1,000	4,922	0.10

The classes contained in the first table of occupation are subdivided into certain groups, and the different castes may be described in the order in which they fall under these heads.

In the Agricultural class (A) the first group is called “military and dominant,” and comprises Kshatriya, Mahratta and Ráchevár.

Kshatriya.—The total number is 21,824, composed principally of 12,287 Kshatriyas, 7,895 Rajputs, and 1,629 Rájapinde. Under the first occur the following subdivisions,—Bais, Bintakúr, Bondili, Dhátri, Govar, Kamsi, Koťári, Rájakula, Ráju (Kanda, Kannađa and Mopúr). The Rajput tribes are,—Chám, Chandrabansi, Chhattri, Chavan, Hindustani, Rajput Gauđa, Rohila, Singh, Sálár, Súrajbansi, Thákúr (Chandra, Dekal, Gayá, Gaharvariya and Navá), Talukhandiya and Tambóli. Under Rájapinde are included Arasu, Bađa Arasu, and Komarapađa. There are also 12 Kođaga or Coorgs. The distribution in the Districts is as follows:—

Caste.	Bangalore.	Kolar.	Tufkur.	Mysore.	Hassan.	Shimoga.	Kadur.	Chitaldroog.
Kshatriya	2,455	783	898	3,740	1,347	1,205	1,450	410
Rajput	1,857	947	990	1,611	364	1,668	166	92
Rajapinde	30	68	92	1,317	—	24	98	—
Total	4,342	1,798	1,980	6,668	1,711	2,897	1,714	502

The Kshatriyas and Rajputs are principally in the army and police. The Rájapinde includes the Arasu, to which belongs the Royal family of Mysore, and other castes connected with the ruling house.

Maráta, or Mahratta.—There are 44,446 of these, of whom over 10,600 are in each of the Bangalore and Mysore Districts, 4,640 in Kolar, and about 3,000 in each of the other Districts. The subdivisions are said to be,—Bhaniya, Baruva, Kine, Kshatrabhánu, Lankekára, Manga, Rávuta, Bhúsà and Kumári; Kine and Bhúsa being more numerous than the others. Their principal occupation is military service, especially as cavalry and rough riders. But the majority have for some time past taken to cultivation and menial service. The Mahrattas are commonly called Aré by the Mysore people.

Ráchevár.—Those belonging to the Agricultural class number 3,696, including the subdivision of Telugu Ráchevár, and 66 Raṇagára. More than a third are in Mysore District, 870 in Bangalore, half that number in Hassan, Kolar, and Tumkur, with 10 in Shimoga. There are no Ráchevár in Chitaldroog, but it has 15 Raṇagára. Both claim a royal connection.

The second agricultural group is the most important one of Cultivators, and contains 128,168 Lingáyita, 1,342,882 Wokkaliga, and 56,710 Tigala, distributed as shown below, with 117 Náyar,¹ nearly all in the Civil and Military Station of Bangalore, and 559 Pille,² mostly in Mysore, Kolar, and Bangalore Districts.

Caste.	Bangalore.	Kolar.	Tumkur.	Mysore.	Hassan.	Shimoga.	Kadur.	Chitaldroog.
Lingáyita ...	13,194	1,421	8,971	52,264	19,260	13,958	9,943	9,157
Wokkaliga ...	225,511	163,160	179,206	325,557	171,323	135,069	73,496	69,560
Tigala ...	29,192	10,156	14,718	1,222	714	197	491	20
Total	267,897	174,737	202,895	379,043	191,297	149,224	83,930	78,737

The principal divisions of the *Lingáyita* in this class are Gauḍamane 58,487, Malava 795, and Pancháchára Gauḍa 68,886; which include the subdivisions Gauḷiga, Gurusthala, Noṇaba and Sáda.

Wokkaliga.—In addition to 163,502 returned simply by this name, the following are the most important tribes:—Gangaḍikára 593,205, Morasu 131,950 (besides Beral-koḍuva 8,066), Sáda 106,407, Reḍḍi (Koḍati, Peddakanti, Pákanati, Nerati, Kamme, Honne, and Hema), 84,653, Kunchatiḡa 84,504, Noṇaba 63,803, Haḷepaika 15,570, Hálu 14,778, Haḷlikára 13,492, Telugu 12,316, Vellája (Bellája and Tuluva)

¹ Including Achpille, Agamuḍi and Panán.

² Including Kaḷlar and Velláa.

9,842, Uppina Koḷaga 9,842, Dása 9,433, Musaku 8,754, Pálya 4,116, Roddugára 3,744, Lálagonḍa 1,959, Svalpa 899, Náḍu 588, Aramuḍi 242, Koṭegára 218, Yellamakápu 171, Konkaṇiga 159, Kanesálu 137, Toṭagára 117, Velnáti 26. The following subdivisions are not separately returned :—A'di, Agni, Agramudi, Aladakápu, Angalika, Báchanige, Baḍagar, Beḷagúḍe, Belakuváḍi, Bhogár, Chittala, Dasavantige, Gaḍakanti, Gausaṇige or Gosangi, Ghaṇiya, Hosadevara, Kamawokkal, Kannaḍa, Karale, Kariga, Káru, Karukal, Kolama, Koluva, Kondakatte, Konga, Koratakápu, Kottadevarakápu, Kumbi, Kudika-wokkal, Kúlibedaga, Kunṭe, Malavaru, Muḍali, Musaku, Muttu, Paḍayachinayakan, Palayar, Pályakár, Pályagár-gauḍa, Pámár, Panasakápu, Panneri, Pelagunda, Peṭṭigesáline, Púḍa, Punamale, Ráyaroddugára, Redḍi (Anche, Arava, Bellála, Kammaḍi, Kápu, Konḍi, Neita, Ráju, Tenugu, and Vaḍaga), Síme, Sírdevara, Sitabhaira, 'Sóle, S'oshya, Togaṭa, Tuluva, Valasakápu, Válú, Vanṭa, Vásudeva, Velama, Vírabhadrakápu, Vellála (Jahala, Lingakatti and Pánḍya), Yedayellama, Yalanáti, Yalavolu, Yéلمانeyavaru.

The following statement, showing the location of the principal great classes in the several Districts, is instructive :—

Wokkaliga.	Bangalore.	Kolar.	Tumkur.	Mysore.	Hassan.	Shimoga.	Kadur.	Chitaldroog.
Gangaḍikára ...	105,284	519	64,478	271,935	126,443	9,081	13,386	2,089
Morasu ...	46,505	84,263	997	21	138	22	4	—
Sáda ...	3,367	4,556	8,891	3,078	4,194	39,669	14,664	27,988
Reddi ...	24,466	40,267	1,640	8,503	352	1,014	355	8,056
Kunchatiḡa ...	11,840	663	44,231	3,488	3,828	8,082	1,614	10,758
Nonaha ...	159	—	30,654	2,010	7,444	8,552	11,119	3,865
Halepaika ...	—	—	—	—	—	12,576	2,994	—
Hálu ...	3	—	—	—	6,818	238	7,719	—
Hallikára ...	2,414	260	5,148	2,409	1,399	935	802	125

The Gangaḍikára are the most numerous of the Wokkaligas, being over 44 per cent. of the whole number, and purely Kannaḍa. They are found principally in the centre and south of the country, and represent the subjects of the ancient province of Gangaváḍi, a Ninety-six Thousand country, which formed an important part of the Ganga empire. The name Gangaḍikára is a contraction of Gangaváḍikára. At the present day the Gangaḍikáras are followers some of Siva and some of Vishnu. Of the former some wear the iinga and others not. These sects neither eat together nor intermarry. The guru of the Vishnu worshippers is the head of the Sri-Vaishnava Brahmans, who lives at Melukote. In addition to being cultivators, the Gangaḍikáras act as farm labourers and as porters.

The Morasu are Wokkaligas chiefly of Kolar and Bangalore Districts. They appear to have been originally immigrants from a district called *Morasa-nád*, to the east of this country, whose chiefs formed settlements in the neighbourhood of Nandidroog. The section called *Beraḷ-koḍuva* (or finger-giving) had a strange custom, which, on account of its cruelty, was put a stop to by Government. Every woman of the sect, previous to piercing the ears of her eldest daughter preparatory to her being betrothed in marriage, had to suffer amputation of the ring and little fingers of the right hand. This was performed, for a regulated fee, by the blacksmith of the village, who chopped off the last joint of each finger with a chisel. If the girl to be betrothed were motherless, the mother of the boy to whom she was to be betrothed was bound to submit to the mutilation unless she had already made the sacrifice. The story invented to account for this barbarous custom is given in the first edition. Since its prohibition the women content themselves with putting on a gold or silver finger-stall or thimble, which is pulled off instead of the end of the finger itself. The principal sanctuary of the Morasu Wokkaligas is at *Síti-beṭṭa* in the Kolar taluq, where there is a temple of *Vrabhadra*.

Of the other large tribes of Wokkaligas, the *Sáda* abound mostly in the north and west. They include Jains and *Lingáyits*, *Vaishnavas*, and *Saivas*. Not improbably they all belonged to the first originally. In the old days many of them acted in the *Kandáchár* or native militia. They are not only cultivators but sometimes trade in grain. The *Reḍḍi* are chiefly in the east and north, and have numerous subdivisions. To some extent they seem to be of Telugu origin, and have been supposed to represent the subjects of the ancient *Raṭṭaváḍi*, or kingdom of the *Raṭṭas*.

The *Noṇaba*, in like manner, are relics of the ancient province of *Noḷambaváḍi* or *Noṇambaváḍi*, a Thirty-two Thousand country, situated principally in the Tumkur and Chitaldroog Districts. It is in these parts and the west that they are now located. At the present day they are by faith *Lingáyits*, the residence of their chief guru being at *Gandikere*, near *Chiknayakanhalli*. The acknowledged head of the *Noṇabas*, though no more than an ordinary cultivator, is the present descendant of an original *Honnappa Gauḍa*, and named after him : he lives at *Hosaḥalli*, near *Gubbi*.

The *Halepaika*, inhabiting the north-west, are of interest, and have already been described above (p. 212). The *Hálu* Wokkaligas are most numerous in *Kadur* and *Hassan* Districts. As their name implies, they combine the keeping of cows or buffaloes and sale of milk (*hálu*) with other agricultural pursuits. The *Haḷlikára* are also largely engaged

with cattle, and the breed of their name is the best in the Amrit Mahal. The Lálagonḍa, principally confined to Bangalore District, are not only farmers, but hirers-out of bullocks, gardeners, builders of mud walls and traders in straw, etc. The Vellálas are the most numerous class of Wokkaligas in the Civil and Military Station of Bangalore.

There do not appear to be any peculiarities deserving of notice in regard to the numerous other classes of Wokkaligas, who are only distinguishable by name. And as in each successive census a good many designations returned in the previous one do not recur, it is evident that some classes are known by more than one name, and probably use different ones on different occasions.

Tigala.—These are skilful kitchen and market gardeners, mostly of Tamil origin, though they have long lost the use of that language. In addition to those called simply by the tribe-name, the following principal divisions are noted :—Uḷli, Vaṇṇe, Paḷli, Reḍḍi, Arava, and Tóṭa, as well as the subdivisions Agra Vannia, Agni, Brahmarishi, Dharmarájukápu, Ennéri, Gauḍa, Haḷe Tigala, Haḷli, Kandapaḷli, Kannada, Pándya, Rája, Sámba, Vannikulá, and Yánádi. Nearly a half are in the Bangalore District, most of the remainder being in Tumkur and Kolar.

The next agricultural group is Forest and other Hill tribes, numbering altogether 67,040. The following are the classes included under this head, with their distribution :—

Caste.	Bangalore.	Kolar.	Tumkur.	Mysore.	Hassan.	Shimoga.	Kadur.	Chitaldroog.
Lambáni ...	3,315	751	2,977	1,084	2,846	14,127	8,794	5,243
Koracha } ...	5,246	3,414	2,470	4,169	1,437	4,398	2,059	1,301
Korama } ...	219	147	1,450	400	45	—	8	—
Kád Kuruba ...	1,042	22	67	—	1	—	—	—
Iruḷiga ...								

The **Lambáni**, or Lambáḍi, also called Sukáli and Brinjári, have the following subdivisions :—Banjári, Bhútya, Dhúmavátpáda, Khetavat, Rámavátpáda, and Sabávat. They are a gipsy tribe that wander about in gangs, accompanied by large herds of bullocks, especially in the hilly and forest tracts where there are few good roads, engaged in the transport of grain and other produce. They first prominently came to notice towards the end of the last century, during the Mahratta and Mysore wars, when immense numbers of them were employed by the armies of both sides as foragers and transporters of supplies required

for the troops.¹ Of late years many of them have been employed as labourers on coffee-estates, and some have even partially abandoned their vagrant life, and settled, at least for a time, in villages of their own. These, called Thánḍas, are composed of clusters of their usual rude wicker huts, pitched on waste ground in wild places. The women bring in bundles of firewood from the jungles for sale in the towns.

The Lambánis speak a mixed dialect, called Kutni, largely composed of Hindi and Mahratti corruptions. In a police report regarding these people, the late Dr. Shortt stated, "that their social system is unique, and that they are guided exclusively by their own laws and customs; that each community is governed by a priest, who exacts and receives implicit obedience, and who exercises, under the cloak of religion and supernatural agency, the undisputed power of life and death over them. They maintain the closest secrecy regarding their customs, and would sooner forfeit life than divulge them. Infanticide, human sacrifice, witchcraft and sorcery prevail among the different communities, who can recognize one another by masonic signs."

The women are distinguished by a curious and picturesque dress, completely different from that worn by any other class. It consists of a sort of tartan petticoat, with a stomacher over the bosom, and a mantle, often elaborately embroidered, which covers the head and upper part of the body. The hair is worn in ringlets or plaits, hanging down each side of the face, decorated with small shells, and terminating in tassels. The arms and ankles are profusely covered with trinkets made of bone, brass, and other rude materials. The men wear tight cotton breeches, reaching a little below the knee, with a waist-band ending in red silk tassels, and on the head a small red or white turban.

It appears² that the Lambánis here have twenty-six clans, and claim a descent from one Cháḍa, who left five sons, Múla, Móta, Naṭhaḍ, Jógḍa, and Bhímḍa. Chaván, one of the three sons of Múla, had six sons, each of whom originated a clan. At some remote period a Brahman from Ajmir married a girl of Chaván's family, and gave rise to the Vaḍtya clan, who still wear the sacred thread. A Mahratta from Jotpur, in northern India, also allied himself with Raṭhoḷ, Chaván's brother, and founded the Khamdat clan. There are no descendants of Móta here, but those of Naṭhaḍ are called Mirásikat, Paradi or Vágri, and live by catching wild birds. The Jógḍas are Jógis. The

¹ A correspondent from the British camp at that time terms them "the worthy and inoffensive Brinjaris."—*Cal. Gaz.* II, 318. But they are often credited with inborn thieving and marauding propensities.

² According to the last Census Report (1891).

Bhímdas are itinerant blacksmiths, known as Bail Kammár. There is even a class of Lambáni outcastes, called Dhálya, who are drummers and live separately. They principally trade in bullocks. The Lambánis acknowledge the Gosáyis as their gurus, and reverence Krishna; also Basava, as representing the cattle that Krishna tended. But their principal object of worship is Bánashankari, the goddess of forests.

The **Koracha** and **Korama** have already been referred to above (p. 214). Although virtually the same people, the following subdivisions are separately noted. For Korachas: Aggada, Dabbe, Gongadi, Kannaða, Telugu, Uppu, Uru. For Koramas:—Bettale, Ganðu, Gázula, Kannaða, Setði, Sátubeða, Uppu, Vaðða, Yáðava, Yanþumúle. For Koravas:—Maval, Palchankófi, Uppu. They wander about with large droves of cattle and asses, conveying salt and grain from one market to another. They carry with them the framework of a rude description of hut, and while one part of the tribe proceeds with the baggage animals, the others settle for a time in some convenient spot, where they erect their huts and employ themselves in making mats and baskets, begging and stealing, until their proximity becomes a nuisance to the villagers and they are compelled to move on. They are described as thieves and robbers from childhood, and are frequently associated with Brinjaris and other vagrants in burglaries, dacoities, and acts of violence, often escaping detection owing to their complete arrangements for obtaining information. They speak Telugu and Tamil, and are said to have a peculiar gipsy language of their own, with a system of signals which enables them to converse with the initiated unobserved. They have no idols to which they pay particular homage, and only invoke Tirupati Venkatramana when in distress, vowing small offerings of money to the temple should they escape.

The men tie up their hair in a large bunch or chignon on one side of the top of the head, in precisely the same manner as we find the men's hair arranged on most of the old sculptured stones of the country. The women wear an immense number of strings of small white and red beads and shells round the neck and falling over the bosom.

The **Kadu Kuruba** and **Jenu Kuruba** have already come under notice (above, p. 213), also the Iruḷiga, who are much like the latter; and certain other forest and hill tribes have likewise been referred to.

We now pass to the Professional class (B), which, under the groups of Priests, Devotees, and Temple-servants, includes 277,086 persons, distributed as follows, 183,451 being Bráhmaṇa, 62,918 Lingáyita, 19,987 Sátáni, 8,132 Jaina, and 2,508 various devotees.

Sect.	Bangalore.	Kolar.	Tumkur.	Mysore.	Hassan.	Shimoga.	Kadur.	Chitaldroog.
Bráhmána ...	29,882	23,930	17,099	43,013	17,151	29,379	17,072	6,015
Lingáyita ...	6,577	3,347	8,544	11,990	8,965	9,620	7,094	7,885
Sátáni ...	3,742	1,937	3,807	4,480	3,660	682	989	696
Jaina ...	359	876	1,526	1,928	1,246	422	1,264	416
Dásari, &c. ...	381	629	413	302	167	232	220	163

Brahmana.—The Brahmans throughout India, with a few exceptions, belong, according to original location or language, either to the Pancha Gauḍa (the five tribes north of the Krishna), or to the Pancha Dráviḍa (the five tribes south of that river). The following are the subdivisions, together with the numbers in Mysore pertaining to each so far as can be gathered from the census returns of 1891 :—

<i>Pancha Gauḍa.</i>		<i>Pancha Dráviḍa.</i>	
Kányakubja (N.W.P.) ...	28	Kárñátaka or Kannaḍa ...	94,329
Sárasvata (Punjab) ...	133	A'ndhra or Telugu ...	33,672
Gauda (Delhi and Bengal) ...	2,067	Dráviḍa or Tamil ...	32,853
Maithila (Behar) ...	..	Maháráshṭra or Mahratta ...	20,087
Utkala (Orissa) ...	..	Gúrjara or Gujarati ...	2

These seldom intermarry, and though the tribes living here have long been intermixed, they generally retain in their families the language of the country from whence they originally came.

The Brahmans are farther subdivided into a number of *gótras*, the original progenitors of which were seven principal *rishis* or sages, namely, Bhrigu, Angiras, Atri, Vis'vámitra, Kásyapa, Vas'ishṭha, and Agastya. In the unlimited ramifications of *gótras* which have branched out from the parent stems, the line of descent is exhibited in the *pravara* or pedigree, and a man and woman of the same *gótra* and *pravara* never marry together. The connection of the *gótra* is entirely in the male line, a woman on marriage being affiliated to the husband's *gótra*. The following are the strongest *gótras* in Mysore, or those containing over 1,000 in each :—

Bháradvája ...	25,950	Kaus'ika ...	9,893	Vádhúla ...	2,788
Kásyapa ...	24,151	Kaundinya ...	9,074	S'ándilya ...	2,495
Vis'vámitra ...	11,771	Harita ...	8,471	Maudgalya	2,252
Vas'ishṭhá ...	11,592	Gautama ...	5,897	Maunabhárgava	1,920
S'rívatsa ...	10,480	Jamadagni ...	3,294	Gárgyáyana	1,162
A'treya ...	10,307	A'ngirasa ...	2,929	S'at'hámarshana	1,050

Altogether sixty-nine gótras are represented here, the remainder, in alphabetical order, being :—Achyuta, Agastya, Ambařisha, As'valáyana, Bídaráyana, Bárhařpatya, Chópagáyana, Dévarája, Dhananjaya, Gálava, Gauđa Sárasvata, Ghřitasams'a, Havikarma, Kálakaus'ika, Kámakáyana, Kaņva, Kapi, Kátyáyana, Kósala, Kuᅇᅇali, Kutsa, Lóhita, Maitréya, Mándavya, Maunjáyana, Mitřvasu, Móhana, Nistudhana, Parás'ara, Párthiva, Paulastya, Paurakutřa, Pútamánasa, Rájendra, Rathítara, S'álankáyana, S'álávatsa, Sankalika, Sankarshana, Sánkhyáyana, Sankřiti, Santasa, S'aunaka, Svatantrakapi, Upamanyu, Vádhyas'va, Vaikhánasa, Vais'ampáyana, Vámana, Vishnuvardhana, Vyása.

Kshatriyas, and others who are not Brahmans, may properly assume the gótra of their *puróhita*, or family priest and domestic chaplain, who is of course a Brahman. But certain classes who are ambitious of being reckoned as Brahmans, have invented gótras for themselves of apocryphal origin.

In addition to the gótra, there is the *s'ákha*, or particular branch or school of the Veda which each Brahman professes to follow in the performance of his sacrifices and rites. Classified on this basis 91,638 are Rig-vedis, 77,972 Yajur-vedis, and 12,776 Sáma-vedis. There are none apparently who acknowledge adhesion to the Atharva veda. Some classes that are not Brahmans boldly proclaim themselves followers of a fifth veda.¹

All the Brahmans here, moreover, belong to one of three main sects :—Smárta, Mádhva, and S'řivaishnava. The following is their distribution, the totals being 129,550, 32,070, and 20,764 respectively :—

Sect.	Bangalore.	Kolar.	Tumkur.	Mysore.	Hassan.	Shimoga.	Kadur.	Chitaldroog.
Smárta	18,939	14,802	12,430	29,911	11,842	23,267	15,060	3,299
Mádhva	7,309	5,834	3,210	6,336	1,057	4,983	1,104	2,237
S'řivaishnava ...	3,354	2,689	1,367	6,751	4,161	1,124	862	456

All three sects are composed of either Vaidikas or Laukikas, the former, those who have devoted themselves entirely to religion, and live on charity; the latter, those who attend to worldly affairs. The

¹ Somewhat on the same principle that the Press in England calls itself the Fourth Estate, supplementary to the three recognized governing estates of king, nobles and commons.

distinction is merely an individual one, as different members of the same family may be either Vaidikas or Laukikas according to inclination.

The Smárta derive their name from *smṛiti*, the code of revealed or traditional law. They worship the triad of Brahma, S'iva, and Vishnu under the mystic syllable *Om*, and while admitting them to be equal, exalt S'iva as their chief deity. They hold the pantheistic Vedánta doctrine of Advaita or non-dualism, believing God and matter to be identical, and everything but an atom of the divinity, they themselves being parts of the Supreme Being. The founder of the Smárta sect was S'ankara or S'ankaráchára, the Hindu reformer of the eighth century, and their guru is the S'ringeri Swámi, designated the Jagad Guru. The probably very ancient sect of the Bhágavata, or the Bhágavata sampradáya, numbering 12,788, are reckoned as Śmártas, but they incline more to Vishnu worship, and follow the Tengale in the time of observing the Ekádas'i fasts. The guru of the Bhágavatas is at Talkáḍ. The distinctive marks of a Smárta Brahman are three parallel horizontal lines of pounded sandalwood, or of the ashes of cowdung, on the forehead, with a round red spot in the centre, but the Bhágavatas wear perpendicular Vaishnava marks.

The Mádharma are so called from Mádharma or Madhváchára, the founder of the sect, who arose in South Kanara in the thirteenth century. They worship both Vishnu and S'iva, but more particularly the former. They profess the doctrine of Dvaita or dualism, considering the Creator and the created to be distinct, and their final absorption to be in the future. It appears that they may be divided into the Vyásakúṭa and the Dásakúṭa. The former adhere strictly to the religious teachings of the founder, which are entirely in Sanskrit. The latter base their faith on hymns and writings in the vernacular, which they can understand, of persons of their sect distinguished as Dásas or servants of God, and they go about with musical instruments singing these in honour of the Divine Being. A Mádharma Brahman is known by a black perpendicular line from the junction of the eyebrows to the top of the forehead, with a dot in the centre. A Smárta may become a Mádharma, and *vice versa*, but the former happens oftener than the latter. In such cases intermarriages between persons of the same circle are not prohibited, though they embrace different doctrines, but the wife always adopts the tenets of her husband.

The S'rivaishnava, also called Aiyangár, are worshippers of Vishnu, as identified with his consort Lakshmi or S'ri, whence their name. The founder of their sect was Rámánuja or Rámánujáchára, who lived in the Chola and Mysore countries at the beginning of the twelfth

century, and after him they are also called Rámánujaṣ in some parts of India. Their creed is the Vis'ishtádvaita, which differs from the Dvaita in attributing both form and qualities to the Deity. In Mysore their guru is the Parakálaswámi of Melukote. They are the most exclusive of all the Brahmans in points of food and intermarriage, the orthodox among them requiring curtains to screen their food from the gaze of others, even their own relations and fellow-sectarians. They form two principal divisions, the Tengale, or southern, numbering 7,161, and the Vaḍagale, or northern, numbering 12,914. The distinction between the two arises from dispute as to certain doctrinal points, said to be eighteen in number,¹ which were formulated some four centuries back, in Sanskrit and Tamil verses, by Manaváḷ Mahámuni on the side of the Tengale, and by Vedánta Desikar on the side of the Vaḍagale, and the dispute has placed a gulf between the parties ever since. There are some differences also in social observances. The Tengale, for instance, do not subject widows to the tonsure, which is usual among other Brahman sects. They also give more prominence to the vernacular versions of their Sanskrit sacred writings. The S'ráishnava are known by the *náma* or trident on the forehead, the centre line being yellow or red, and the two outer ones white. The Tengale distinguish themselves from the Vaḍagale by continuing the central line of the trident in white for some distance down the nose.

The three main sects above described contain nearly eighty recorded subdivisions, distinguished by names which are mainly territorial or numerical in origin. The derivation of many of the names appears to be unknown even to those who bear them.

Those included under Smárta and Mádhva, in alphabetical order, are :—Adi S'aiva, Aruvattu-wokkalu, A'ruvélu, A'ruvelu Niyógi, Ashta-sahasra, Baḍaganád, Bhágavata-sampradáya, Bodháyana, Brihach-charaṇa, Chitpávan, Dés'astha, Devalaka or Sivarádhya, Drávida, Haḷa Karṇáṭaka or Haḷa Kannaḍiga, Havika or Haiga, Hoysaniga, Kambálúr, Kamme (Babbúr, Kannaḍa, Ulcha and Vijayapura), Kandávára, Karáḍe, Karṇáṭaka, Kásalnád, Kátyáyana, Kavarga, Káfnád, Konkaṇ-astha, Kóṭa (or Kaikóṭa and Ippatnákaravaru), Koṭis'vara, Kus'asthala (or Senve), Mádhva (Vaishnava and Pennattur), Mulikinád or Muri-kinád, Nambúri, Nandavaidika, Niyogi, Panchagráma, Práknád, Prathamás'ákhe (Kánva, Mádhyanjana or Yájnavalkya), Sahavási, Sanketi, S'árvarya, S'írnád, S'is'uvarga, S'ivalli (or Kurus'ivalli), S'ukla Yajus's'ákhe, Telagháṇya, Toṭada Tigala, Tulava, Uttráji (or Uttrádi), Vaḍama, Vádhyama, Vangpúram, Véginád, Velnád.

¹ The majority are detailed in the Census Report for 1891.

The strongest of these divisions numerically are,—those returned simply as Smártas, 23,374; Badaganáḍ, 23,019; Des'astha, 17,127; Kamme (Babbur, Kannaḍa and Ulcha), 14,265; Mulikináḍ, 11,188; Hoysaniga, 8,328; Drávida, 7,856; Haḷe Karṇátaka, 7,526; Vaishnava (Mádhva), 7,280.

The Baḍaganáḍ had their origin in the northern (*baḍaga*) districts (*náḍ*), and speak Kannaḍa: they are both Smártas and Mádhvas. The Des'astha are immigrants from the Mahratta country, and mostly retain the use of Mahratti: they are Smártas and Mádhvas, the latter preponderating; but the difference of faith is no bar among them to intermarriage and free social intercourse. The Babbur Kamme are all Smártas; the Kannaḍa Kamme and Ulcha Kamme are both Smártas and Mádhvas: nearly all speak Kannaḍa, a few Telugu also. The Kamme country seems to have been to the east of the Kolar District. The Mulikináḍ or Murikináḍ are Smártas from the Kadapa district, speaking Telugu. The present chief priest of S'ringeri is of this sect. The Hoysaniga, also called Vaishaniga, are chiefly Smártas and speak Kannaḍa. Their name may be derived from the old Hoysala or Hoysana kingdom. The Dráviḍa, Vaḍama (1,454), and Brihachcharama or Pericharana (1,293), may be taken together: they are immigrants from the Tamil country, and are Smártas, speaking Tamil, and a few Telugu. The Haḷe Karṇátaka or Haḷa Kannaḍiga are mostly confined to the Mysore District, where they are generally village accountants. There are two branches—Múgúr and Sósile. They are nearly all Smártas, and their language is Kannaḍa. Though their claim to be Brahmans was apparently not denied, they were for some reason, till recently, under a sort of ban, and often called by a nickname; but about twenty-five years ago they were publicly recognized by both the S'ringeri and Parakála maṭhas. Other Brahmans, however, have no intercourse with them, social or religious.

Of the other sects, the A'ruvélu, or the Six Thousand (4,486), are both Smártas and Mádhvas, and speak both Kannaḍa and Telugu. The A'ruvélu Niyógi are a branch of them, who are laukikas, or devoted to secular callings. The Aruvaṭṭu-wokkalu or Sixty families (4,997) originally formed a portion either of the A'ruvélu or the Kamme, but were selected as his disciples by Vyásaráya Swámi, of the Mádhva faith, two or three centuries ago. The small sect of Kambálúr or Tóṭada Tigala (113), mostly in Shimoga District, are also connected with the A'ruvélu. Moreover, the Uttaráji or Uttarádi (425), appear to have branched off from the A'ruvélu some three or four centuries ago, when they became the disciples of S'ripáda Ráya of Venkatagiri.

The addition of these several offshoots would bring the number of the A'ruvélu up to 9,921.

The Chitpávan (2,345) are Mahrattas and Smártas. The Havika or Haiga (3,246) are immigrants from Haiga, the ancient name of North Kanara, and they are almost entirely confined to the west of the Shimoga District. They are Smártas, and are now principally engaged in the cultivation of areca-nut gardens. According to tradition they are of northern origin, and were introduced by one of the Kadamba kings, in the third or fourth century, from Ahichchhatra. This would bring them from Rohilkand, but Ahichchhatra may be only a learned synonym for Haiga (see note above, p. 216). The name Havika is said to be a corruption of Havyaka, or conductor of sacrifices, and perhaps it was for such purposes that they were imported at a time when there were no Brahmans in those parts. The small communities of Kandávvara (213), Kavarga (7), Kóṭa and Kóṭis'vara (25), Kus'asthala, S'is'uvarga, properly S'ishyavárga (139), with the S'ivalli (2,397), are all Tulu Brahmans, immigrants from South Kanara, the ancient Tuluva, and mostly located in the western Districts. They engage in agriculture and trade, and speak Tulu and Kannaḍa. The Karáde or Karháde (253) are Mahrattas from Karháde. Some of them are employed in the Revenue Survey. The Konkanastha (296) are also Mahrattas from the Konkan, and are Smártas. The above two sects do not intermarry, but mix freely in other respects. The Nandavaídika (1,257) are from the Teluga country: both Smártas and Mádhvas: language Telugu and Kannaḍa. The Prathamás'ákhe (5,027) and Súklayajus's'ákhe or Mádyándina are both Smártas and Mádhvas: they speak Telugu and Kannaḍa. The Sahavási are immigrants, like the Chitpávan, from the Mahratta country.

The Sankéti (2,522) are Smártas from Madura, and speak a corrupt mixture of Tamil and Kannaḍa. There are two branches, the Kaus'ika and the Beṭṭadpur, so named from the places in which they first settled, which are in the Hassan and Mysore Districts. They eat together, but do not intermarry as a rule. The Kaus'ika, however, who were the first comers, are said occasionally to get wives from the Beṭṭadpur, but in such cases the girl's connection with the latter altogether ceases. The Sankéti reverence a prophetess named Nácháramma or Nangiramma, who seems to have been instrumental in causing their migration from their original seats. The story about her is given in the first edition. The Síranáḍ (3,490) have two divisions, the Hale Síranáḍ, who are Smártas, and the Hosa Síranáḍ, who are chiefly Mádhvas. Both speak Kannaḍa and derive their name probably from Síra in the Tumkur District. The Vengipúram (193) are all Smártas, speaking Telugu.

The Velnáđ (3,181) are also Telugu Smártas, and resemble the Murikináđ. They are mostly in the south and east. The Végináđ are Smártas, and speak Kannađa. There is only one member returned of this sect, a man in Kolar District.

The subdivisions of the S'rívaishnavas, in alphabetical order, are :— Bhaṭṭaráchárya, Embár, Hebbár (Mélnátár), Hemmigeýár, Kađambiyár, Kaṇđáđe, Kílnátár, Manđyattár, Maradúrár, Méṭukunṭeyár, Morasanáđ, Munchóli or 'Chóli, Nallánchakravarti, Prativádi-bhayankarattár, Somes'ándál or Attán-kúṭattár, Tirumaleyár. No less than 16,817 have returned themselves simply as S'rívaishnavas.

The Bhaṭṭaráchárya are Tengales, and generally Vaidikas: they speak Telugu and Tamil. The Embár are Tengales from S'rírangam, and speak Tamil. The Hebbár (1,724) are descendants of immigrants from the Tamil country, who settled in five different villages, and were hence also known as the Panchagráma (358). These places were Gráma (Hassan District), Kađaba (Tumkur District), Molúr (Bangalore District), Hangala (Mysore District), and Belur (Hassan District). Hebbár was the old Brahman designation of the headman of a village, as Heggáđe was of the Jains, and these names still linger in the west. It is said to be a corruption of *heb-hárava*, or the head Brahman. The settlers in Gráma, it appears, had acquired this title, which owing to their connection was extended to all the Panchagráma. They all eat together and intermarry: are both Tengale and Vađagale, and speak Tamil. The Hemmigeýár are all Vaidikas and Vađagale, settled at Hemmige near Talkád, which is said to have been granted by the king of the day to one of their ancestors as a reward for distinguishing himself in a literary discussion. Their language is Tamil. The Manđyattár (566) are immigrants from a village called Manđyam near Tirupati. They are located in Melukóte and Mandya, the latter being named after their native place. They are all Tengale and speak Tamil. The Maradúrár are similar settlers at the neighbouring village of Maddúr, which is a corruption of Maradúr. The Méṭukunṭeyár are Vađagale and disciples of the Parakálaswámi. They speak Telugu and Tamil. The Munchóli and Chóli, so called because they retain the lock of hair in front of the head, are Tengale, and their language is Tamil. The Nallánchakravarti are Vađagale from Conjeveram, and are all Vaidikas, speaking Tamil. The Prativádi-bhayankarattár, meaning the terrifiers of opponent disputants, are Tengale and Vaidikas from S'rírangam: language Tamil. There are only two men of this sect put down, both in Kolar District. The Somes'ándál are Vađagale, and chiefly Vaidikas, from the same part: language Tamil. The Tirumaleyár (262) are descendants of Koṭi-

kanyádána Tátáchárya, whose name implies that he had given away a million virgins in marriage, a son of the guru to Ramánujáchárya. They are all Vaḍagales and Vaidikas, and seem to have come from Conjeveram. They speak Tamil.

The Temple servants or Brahmans who act as *pújáris* are all Vaidikas, but are considered to have degraded themselves by undertaking such service, and the other Brahmans will have no connection with them. The S'ivadviya or Sivaṇambi (605) and Tambaḷla (2) are of the Smárta sect, and officiate in S'iva temples. The Vaikhámasa (407) and Páncharátrál (142) belong to the S'rívaishnavas, and officiate in Vishnu temples. The Tammaḍis who officiate in certain Siva temples are Lingáyits.

Lingayita.—The priestly orders amoñg these are the A'rádhya (11,618), Gurusthala (12,129), Jangama (38,215) and Vira S'aiva (956). The A'rádhya are a sect of Lingáyit Brahmans. They assume the *janivára* or sacred thread, but call it *s'ivadára*. The Gurusthala are a class of Jangama who take the place of gurus in performing certain domestic ceremonies for which the gurus do not attend. The Jangama are priests chiefly of the Panchama Banajiga and Devánga. They are divided into Charanti and Virakta, the former being under a vow of celibacy. The Jangama derive their name especially from the portable or *jangama* linga worn on the person (which indeed is characteristic of all Lingáyits) as distinguished from the *sthávira* or fixed linga of the temples, and also perhaps from their being itinerant. In addition to the linga they wear a necklace of beads called *rudráksha*, and smear their whole bodies with the ashes of cow-dung. A Jangam will not permit himself to be touched by any person who does not wear the linga. They wander about and subsist on charity, and their children generally adopt the same profession.

Sátáni.—These are regarded as priests by the Holeya and other inferior castes, while they themselves have the chiefs of the S'rívaishnava Brahmans and Sannyásis as their gurus. Their subdivisions are Khádri Vaishnava, Nátachárasúrta, Prathama Vaishnava, Sameráya or Samagi, Sankara, Sáttádhava, Súri, Telugu Sátáni, Venkaṭapurada and Vaishnava. Some are employed in agriculture, but as a rule they are engaged in the service of Vishnu temples, and are flower-gatherers, torch-bearers and strolling minstrels. Buchanan supposed them to be the remains of an extensive priesthood who formerly held the same relation to the Holeya that the Brahmans now do to the Súdras. But as a sect they appear to be of more modern origin. They call themselves Vaishnavas and correspond with the Baisnabs in Bengal. They are followers of Chaitanya, from whose name, or that of Sátánana, one of his

disciples, their designation may be derived. Properly speaking, they are not a caste, but a religious sect of votaries of Vishnu, more especially in the form of Krishna, who have ceased to regard caste distinctions. In the north of India admission to the sect is obtained by payment to a Gosáyi and partaking of food with other members of the sect.

Jaina.—The priests of this religion have been returned as Tírthankara (2,564) and Pítámbara (5). The Jaina yatis or clergy here belong to the sect of Digambara, properly, clad with space, that is nude, but they cover themselves with a yellow robe, and hence the name Pítámbara. An account of the Jaina will be found under Religion.

The Devotees and religious mendicants are,—among Hindus, Dásari (1,178), Sannyási (684), Gosáyi (424), and Bairági (222): among Lingáyits, Ayya, Ganadhisvara, Shaṭsthala and Vaḍer (956): among Jains, Digambara (5,477), Svetámbara (85), and Báváji (1).

Dásari are mendicants belonging to different castes of Súdras. They become Dásas, or servants, dedicated to the god at Tirupati, by virtue of a particular vow, made either by themselves or relatives at some anxious or dangerous moment, and live by begging in his name. Dásaris are strictly Vishnuvites, as the vow is taken only by castes who are worshippers of that deity. Dásaris are always invited by Súdras on ceremonial days and feasted. The subdivisions are Dharma, Gúḍama, S'anku, and Tírunáma Dásaris.

A **Sannyási** is properly a man who has forsaken all. He has renounced the world, and leads a life of celibacy and abstemiousness, devoting himself to religious meditation and abstraction, and to study of the holy books. He is considered to have attained to a state of exalted piety that places him above most of the restrictions of caste and ceremony. It is the fourth *ásrama* or final stage of life for the three higher orders. The number of Brahman Sannyásis is very small, and chiefly confined to those who are gurus or bishops of the different sects. These are as a rule men of learning and the heads of monasteries, where they have a number of disciples under instruction who are trained for religious discussion. They are supported entirely by endowments and the contributions of their disciples. Periodical tours are undertaken for the purpose of receiving the offerings of their followers. They travel in great state, with elephants, horses, and a retinue of disciples. On the approach of a guru to any place all the inhabitants of pure birth go out to meet him: the lower classes are not admitted to his presence. On being conducted to the principal temple, he bestows *upadésa* or *chakrántikam* on such as have not

received these ceremonies (which may be considered analogous to confirmation by prelates in the English Church), and distributes holy water. He inquires into their matters of contention or transgressions against the rules of caste, and having disposed of these, hears his disciples and other learned men dispute on theological subjects. This is the grand field for acquiring reputation among the Brahmans.¹ The gurus are bound to spend all they get in what is reckoned as charitable distribution, that is in the support of men and buildings dedicated to the service of the gods. But the majority of the Sannyásis (of whom no less than 412 are in the Kolar District, and 175 in Tumkur) are a class of Súdra devotees who live by begging and pretend to powers of divination. They wear the clerical dress of red ochre and allow the hair to grow unshorn. They are married and often have settled abodes, but itinerate, and their descendants keep up the sect and follow the same calling.

The **Gosayi** are followers of Chaitanya, the Vishnuvite reformer of the sixteenth century, whose original disciples, six in number, were so called. They never marry, but the order is recruited from all the four principal castes, especially the two highest, and those who join are cut off for ever from their own tribes. Such as lead a strictly ascetic life are called Avadhúta, while those who engage in commerce and trade are called Danđi. Most of those in Mysore belong to the latter subdivision, and are wealthy merchants from northern and western India, settled in Mysore, Bangalore and other chief towns, dealing largely in jewels and valuable embroidered cloths. The profits of their traffic go to their Mahant or teacher. The property of either Avadhúta or Danđi devolves on his *chela* or adopted disciple.

The **Bairági** are followers of Rámánand, the Vishnuvite reformer, who early forsook the cares of the world and gave himself up to Vairágya, or the renunciation of all worldly desires, becoming the first Vairági or Bairági. From his four disciples arose four sects, each of which is composed of Nihangs, those who are purely ascetics and lead secluded lives, and Sámayógis, who marry and live with their families; but both orders can eat together. Many profess to be physicians and herbalists, while others pretend to be alchemists. All are beggars, and as pilgrims resort to holy places, especially to Tirupati. Their usual route in the south is from Rámes'vara to Totádri, which is in that neighbourhood, S'rirangam, Gopalswámibeṭṭa, Melukóte and Tirupati. They are also called Sádhu and are all worshippers of Vishnu and

¹ These disputations are said to be very similar to those which were common among the doctors of the Romish Church seven or eight hundred years ago.—*Buchanan.*

adherents of Śrīvaiṣṇava Brahmans. They are mostly taken from the Śūdra castes, but many of them wear the triple cord and profess themselves to be Gauda Brahmans from the north. Half the number at the census time were in Bangalore District and a considerable number in Kadur. There were none in Hassan and Shimoga, and only three in Chitaldroog.

The **Vader**, a corruption of Oḍeyar or Vaḍeyar, meaning lord or master, are Lingāyits like the Jangamā. They are held in great veneration in their sect and are feasted by laymen on all important occasions, especially at Śīvarātri, when their attendance is said to be in such great demand that they have to hurry from house to house, just tasting a morsel in each. Mostly in Kadur, Mysore and Shimoga Districts; none in Kolar and Hassan.

The **Digambara** and **Svétāmbara** are the two great sects of the Jains. The derivation of the former name has already been given above. The Svétāmbara are those who are clad in white. This section is found more in the north of India, and is represented by but a small number in Mysore. The Digambara are said to live absolutely separated from society and from all worldly ties. Most numerous in Mysore, Tumkur and Kadur Districts.

Quitting the religious groups we come to that of the professional Writers, of whom there are 108 Kanakkan and 6 Káyastha, all in the Civil and Military Station of Bangalore. The former may be allied to the Karṇams and Kanakka-pillai (commonly called Conocopoly) of the Madras country, who are village and other accountants. The Kanakkan include the subdivisions of Karṇikar, Śírkanakkan, and Śírkarṇikar. The Káyastha are from northern India and have a subdivision called Mádúr.

Next are Musicians and Ballad-reciters, the well-known Bhāṭs or Bhaṭráju, numbering 1,388, and found chiefly in the eastern and southern Districts. They speak Telugu and are supposed to have come from the Northern Sarkars. They were originally attendants on Hindu princes as professional bards, singing their praises and reciting ballads on the wondrous deeds of their ancestors.¹ Now, from want of

¹ The name is a curious approximation to that of the western *bard*, and their offices are nearly similar. No Hindu Rája is without his *bhāṭs*. Haidar, although not a Hindu, delighted to be constantly preceded by them, and they are an appendage to the state of many other Musalman chiefs. They have a wonderful facility in speaking improvisatore, on any subject proposed to them, a declamation in measures, which may be considered as a sort of medium between blank verse and modulated prose; but their proper profession is that of chanting the exploits of former days in the front of the troops while marshalling for battle, and inciting them to emulate the glory of their ancestors.—*Wilks*, in 1810.

their ordinary employment, they have descended into the mendicant class. They are principally worshippers of Vishnu.

The Dancers and Singers follow, composed of Naṭuva (1,804) and Kaikola (5,672). The subdivisions are Binkali Kaikola, Bógaváru, Devadási, Gáyaka, Lókabálike, Náyaksáni. The women dance and sing; the men are musicians and accompany them on various instruments. Nearly all the Kaikola are in Mysore District: those that speak Kannaḍa are of Lingáyit connection and called Basavi. The Naṭuva are most numerous in Kolar and Mysore Districts: those who speak Telugu are of the Telugu Banajiga caste. The females are generally prostitutes and attached as dancing girls to Hindu temples. The class is recruited either from those born in it or those adopted from any of the Hindu castes. Sometimes the parents of a girl have dedicated her to a temple even before her birth; in other cases good-looking girls are purchased from parents who are too poor to maintain them.

The last professional group is the Chitári, who are classed as Ráchevár, and composed of Chitragára, also called Baṇṇagára (912), mostly in Mysore, Tumkur and Chitaldroog Districts, and Jínagára (3,728), nearly all in Shimoga District. They are painters, decorators and gilders, and make trunks, palanquins, lacquer toys and wooden images for temples, cars, etc.

The Commercial class (C) consists entirely of Merchants and Traders. The following are the principal divisions according to strength, with their distribution. There are also 161 Baniya, 2 Múltáni, and 1 Ját, all in the Civil and Military Station of Bangalore; 83 Márváḍi, and 71 Gujaráti.

Caste.	Bangalore.	Kolar.	Tumkur.	Mysore.	Hassan.	Shimoga.	Kadur.	Chitaldroog.
Lingáyita ...	19,700	6,139	21,289	91,257	39,006	49,333	21,052	44,297
Banajiga ...	28,437	36,296	12,408	17,811	3,735	6,709	5,115	4,224
Kómati ...	4,766	8,890	5,304	3,210	1,766	1,175	1,338	2,605
Nagarta ...	5,289	3,004	315	439	77	7,966	5,223	651
Mudali ...	1,625	714	380	1,305	167	229	225	492
Jaina and S'rávaka	108	18	305	230	65	2,974	43	200
Láḍar ...	53	18	134	1,185	91	11	338	216

Of the 292,073 Lingáyita, forming 62 per cent. of the trading community, 222,389 are returned by that name alone and preponderate in Mysore District. Other divisions are Linga Banajiga (37,322), most numerous in Chitaldroog and Hassan Districts; Sajjana (30,424),

adherents of Śrīvaishnava Brahmans. They are mostly taken from the Śúdra castes, but many of them wear the triple cord and profess themselves to be Gauda Brahmans from the north. Half the number at the census time were in Bangalore District and a considerable number in Kadur. There were none in Hassan and Shimoga, and only three in Chitaldroog.

The **Vader**, a corruption of Oḍeyar or Vaḍeyar, meaning lord or master, are Lingáyits like the Jangama. They are held in great veneration in their sect and are feasted by laymen on all important occasions, especially at Śivarátri, when their attendance is said to be in such great demand that they have to hurry from house to house, just tasting a morsel in each. Mostly in Kadur, Mysore and Shimoga Districts; none in Kolar and Hassan.

The **Digambara** and **Svétámbara** are the two great sects of the Jains. The derivation of the former name has already been given above. The Svétámbara are those who are clad in white. This section is found more in the north of India, and is represented by but a small number in Mysore. The Digambara are said to live absolutely separated from society and from all worldly ties. Most numerous in Mysore, Tumkur and Kadur Districts.

Quitting the religious groups we come to that of the professional Writers, of whom there are 108 Kanakkan and 6 Káyastha, all in the Civil and Military Station of Bangalore. The former may be allied to the Karṇams and Kanakka-pillai (commonly called Conocopoly) of the Madras country, who are village and other accountants. The Kanakkan include the subdivisions of Karṇikar, Śirkannakkan, and Śirkarṇikar. The Káyastha are from northern India and have a subdivision called Mádúr.

Next are Musicians and Ballad-reciters, the well-known Bháṭs or Bhatráju, numbering 1,388, and found chiefly in the eastern and southern Districts. They speak Telugu and are supposed to have come from the Northern Sarkars. They were originally attendants on Hindu princes as professional bards, singing their praises and reciting ballads on the wondrous deeds of their ancestors.¹ Now, from want of

¹ The name is a curious approximation to that of the western *bard*, and their offices are nearly similar. No Hindu Rája is without his *bhāṭs*. Haider, although not a Hindú, delighted to be constantly preceded by them, and they are an appendage to the state of many other Musalman chiefs. They have a wonderful facility in speaking improvisatore, on any subject proposed to them, a declamation in measures, which may be considered as a sort of medium between blank verse and modulated prose; but their proper profession is that of chanting the exploits of former days in the front of the troops while marshalling for battle, and inciting them to emulate the glory of their ancestors.—*Wills*, in 1810.

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more than half in Shimoga District ; Sthaladava (1,243), nearly all in Bangalore District ; Panchamasále (182), nearly the whole in the Civil and Military Station of Bangalore ; Hirehasube (101), almost all in Mysore District ; and Kórisetti (52), all in Tumkur District. Further subdivisions are Baḍagalava, Bannadava, Basale, Bávane, Gáḍa Lingáyita, Gaddigeyava, Jóti Banajiga, Kannaḍiga, Kanṭhapávaḍe, Kaikola, Mélpávaḍe, Nírumélinava, Péṭemane, Tógasetti, and Turukáṇe Banajiga. In the rural parts they are perhaps engaged more in agriculture than in trade.

The *Banajiga* number 114,735, and form 24 per cent. of the traders. The strongest section is that of Telugu Banajiga (59,495), the greater number in Kolar and Bangalore Districts, as are also those put down simply as Banajiga (17,779). The Setti (14,875) are most numerous in Tumkur District and the Civil and Military Station of Bangalore. The Dása (7,925) are chiefly in Mysore District. The Bale (5,378), makers and vendors of glass bangles, are chiefly in the Civil and Military Station of Bangalore. The Yeḷe (3,601), or betel-leaf sellers, are most numerous in Mysore and Tumkur Districts. Dévāḍiga (2,315), bangle-sellers, nearly all in Shimoga District, and the rest in Kadur District ; Náyaḍu (1,141), most numerous in Bangalore and Chitaldroog Districts ; Huvváḍiga (905) or flower-sellers, nearly all in Kadur District ; Araḷe (340) or cotton-sellers, mostly in Mysore and Bangalore Districts ; Sukhamanji (313), nearly all in Bangalore District, and the rest in Kolar District ; and Muṭṭarasu (7), all in the Civil and Military Station of Bangalore, make up the remaining chief sections. The minor subdivisions are A'di, Aggada, A'kuléti, Bhérisetti, Banṭa, Biḍára, Dés'áyi, Dharmaráju, Gájulabalji, Gaṇḍhúḍibalji, Gérballi, Gauḍu, Ganga, Kaláyi, Kamme, Kannaḍa, Kápáli, Kavare, Kempṭi, Kempu, Kolla, Kotta, Lingabalji, Marasi, Mudusárebali, Múrusre, Mutta, Muttaráju, Pagaḍála, Pasaluváṭe, S'iváchára, Sólíyasetti, Vírassagada, and Yellamma. The principal occupations of Banajigas are agriculture, labour and trade of all kinds.

The *Kómaṭi* (29,054) and *Nagarta* (22,964) are principally found in towns and large trade centres. Both claim to be Vaisyas, and the former are specially considered to be such. The *Kómaṭi* subdivisions are Kannaḍa, Myáda, Setti, Trikarma, Tuppada, and Yavamanta. The majority are worshippers of S'iva and a few of Vishnu, but the chief object of reverence is the goddess Kanyaka Parames'vari. All eat together and intermarry. They deal in cloth and, except spirits, in all kinds of merchandise, especially money and jewels, but never cultivate the ground nor become mechanics. The *Nagarta*, besides 4,297 only so named, chiefly in Bangalore and Kolar Districts, are subdivided into

Ayódhyañagara (39), all in Bangalore District; Bhéri (229), nearly all in Kolar District; Námadhári (15,428), mostly in Shimoga and Kadar Districts; and Vais'ya (2,971), most numerous in Bangalore and Kolar Districts. There are also minor sections called S'iváchár and Vaishnava. Of the Nagarta some are worshippers of Vishnu and others of S'iva: of the latter a part wear the linga and others not. The three sects do not intermarry or eat together. They are dealers in bullion, cloth, cotton, drugs and grain, but do not cultivate the ground or follow any handicraft trade, though some act as porters.

The *Mudali* (5,437) or Mudaliyár, with the subdivision Agamudi, are of Tamil origin, from Arcot, Vellore and other places, the offspring of traders, servants and contractors who followed the progress of British arms. The majority are in the cities of Bangalore and Mysore. They are a thriving and money-making class, and many of them are employed under Government: they also engage in trade of all kinds, and as contractors for buildings and other public works.

Of the *Jaina* (1,981) and *S'rāvaka* (1,962) the great majority of the former and the whole of the latter are in Shimoga District, and probably represent a very ancient trading community of those parts. The *Láðar* (2,046) are traders from the Mahratta country, and are principally settled in the Mysore District.

The *Baniya* are wealthy money-lenders from other parts. Their divisions are Agarvála, Bakkal, Jaman, Multáni, and Oswál. The *Márvádi* (Dodaya and Kumbi), *Gujarátí* and *Multáni* are traders from the countries after whose names they are called. The *Márvádi* deal in pearls and cloths. The *Gujarátí* are small money-lenders, and also trade in jewels, cloths and other articles.

The class Artisan and Village Menial (D) includes the following:—

Smiths, Carpenters and Masons ...	Pánchála ...	113,731
Barbers	Náyinda	37,296
Tailors	Darji	10,664
Weavers and Dyers	Neyigára, Góniga	88,413
Washermen... ..	Agasa	85,671
Cowherds, &c.	Golla	128,995
Shepherds	Kuruba	346,768
Oilpressers	Gániga	35,808
Potters	Kumbára	40,809
Salters	Uppára	89,123
Gold-lace makers	Sarige	15
Fishermen	Besta	99,897
Toddy drawers	I'diga	39,937
Village Watchmen, &c.	Holeya	520,493
Leather workers	Mádiga, Mochi	240,321

The subjoined table shows their distribution over the several Districts :—

Caste.	Bangalore.	Kolar.	Tumkur.	Mysore.	Hassan.	Shimoga.	Kadur.	Chitaldroog
Pánchála ..	14,105	9,688	9,685	37,448	13,588	12,107	8,745	8,365
Náyinda ...	7,971	8,559	3,807	2,401	2,979	2,828	923	1,828
Darji ...	3,668	574	908	1,457	511	2,090	734	722
Neyigára ...	24,492	8,696	8,109	10,224	12,808	6,674	10,236	7,174
Agasa ...	11,447	10,327	10,323	19,435	10,456	13,103	4,186	6,394
Golla ...	20,430	20,022	38,237	5,445	5,212	3,995	4,149	15,892
Kuruba ...	41,407	35,304	38,186	115,805	40,730	23,683	26,255	25,398
Gániga ...	5,909	5,790	3,305	15,634	2,259	547	1,092	1,272
Kumbára ...	4,306	3,962	3,183	16,136	3,313	3,281	4,018	2,610
Uppára ...	1,516	3,127	11,568	34,717	8,566	10,956	10,000	8,673
Sarige ...	10	5	—	—	—	—	—	—
Besta ...	8,357	3,910	4,201	59,550	7,628	7,290	4,102	4,859
I'diga ...	2,569	1,708	5,348	8,450	2,757	10,944	3,882	4,279
Holeya ...	81,369	57,665	23,616	173,003	87,055	38,000	51,291	8,491
Mádiga ...	46,329	39,661	48,324	24,179	11,190	23,043	10,453	37,142

The *Pánchála*, as their name implies, embrace five guilds of artisans, namely, Agasále, or goldsmiths; Kanchugára, brass and copper smiths; Kammára, blacksmiths; Baḍagi, carpenters; and Kalkuṭaka, stone-masons. They profess to be descended from the five sons of Vis'vakarma, the architect of the gods, who severally adopted these professions. The various trades are not confined to particular families, but may be followed according to the individual inclination. The Pánchála wear the triple cord and consider themselves equal to the Brahmans, who, however, deny their pretensions. The goldsmiths are the recognized heads of the clan and have a caste jurisdiction over the rest.

The Agasále, or Akkasále proper (63,578), and goldsmith Pánchála (31,958) have also subdivisions called Bailu Akkasále or Rótvád (337), Paṭṭár or Paṭṭari (747), Oja or Vájar (737), and Jalagára (258), as well as A'chári, Arava Pánchála, Manu, Maya, Panchagrâma, Sajjana, Sonár, Sonájiband, Vaivaghni, Vis'va, Vis'vabrahma, and Vis'vaghni. Some are followers of S'iva and others of Vishnu, but the difference in religion is no bar to intermarriage or social intercourse. The most influential members are among the S'aivas and wear the linga, but they do not associate with any other linga-wearers. The Jalagára are the people who wash the sand of streams for gold. The majority are returned from Mysore District:

The Kanchugára (369) or brass and copper smiths are divided between the Bangalore and Mysore Districts. The section called

Gejjegára (27) are all in Mysore. These make the small round bells used for tying about the heads or necks of bullocks. Dancing girls also bind them to the ankles when dancing, and postal runners have a bunch at the end of the rod on which they carry the mail bags, the jingle giving notice of their approach.

The Kammára (6,250) or blacksmiths, include Bailu Kammára, Kaḷḷar and Karman. The Kammára is a member of the village corporation, and in addition to working in iron often acts as a carpenter as well. In the repair of carts and agricultural implements his services are constantly in demand.

The Baḍagi (8,643) or carpenters, and Gaundar (3), the latter confined to the Civil and Military Station of Bangalore, have sections called Pancháchára, Guḍigára, S'ilpi and Yiśvakarma. The Baḍagi is also a member of the village corporation, but the profession of carpentry is now taken up by other castes, such as Kunchiṭiga and Wokkaliga, not to mention Musalmans. The Guḍigára are specially the producers of the beautiful sandal-wood carving for which the Mysore country is famous. They are settled in Shimoga District, chiefly at Sorab. S'ilpi are properly sculptors, and might be classed among masons.

The Náyinda or barbers, also called Hajám, include a number of sections, namely, Balaji, Bajantri, Bengáli, Karṇáta, Kelasi, Konda, Kondamangala, Mangala, Náṭa, Nátamangala, Reḍḍi, S'ilavanta, Teluga and Uppina. The Náyinda is a member of the village corporation. They speak both Kannaḍa and Telugu, and are generally employed as musicians as well as barbers: in the former capacity they are in great requisition at feasts and marriages. They include worshippers of both Vishnu and S'iva, the S'ilavanta being Lingáyits.

The Darji or tailors, besides 4,817 so returned, include Shimpi or Chippiga (12), Námdév (3,566) and Rangáre (2,269). The latter are also dyers and calico-printers. The Darji are immigrants from the Mahratta country and specially worship Viṭṭhóba or Krishna.

The Neyigára (86,986) are weavers proper, the Góniga (1,426) being specially sack weavers and makers of gunny bags (*góni*). The main divisions of the former are Devánga (49,006), Togāta or Dandasetti (13,300), Sále or Sáliga (10,255), Bilimagga (9,946), Séniga (105), Patvegár (3,174), Khatri (946), and Sauráshṭraka (254). In these are included minor sections called Jáda, Kuruvina, Padmamurikináti, Padmasále, Paṭṭasále, Paṭnúlukár, Sakunasále, and Singundi.

The Kannaḍa Dévānga are weavers who wear the linga, but they have no intercourse with the Linga Banajiga. They worship S'iva and Párvati, and their son Gaṇés'a, who is a special patron of their looms.

There are also Telugu *Dévanga*, who are of two sects, one of whom worship Vishnu and the other *S'iva*, but the latter do not wear the *linga*. This difference of religion is no bar to intermarriage, and the wife adopts the religion of her husband. The *Togaṭa*, most numerous in the eastern Districts, are of Telugu origin and worshippers of *S'iva* in the form of his consort *Chauḍes'vari*. They manufacture the coarse kinds of cloth that are worn only by the poorer classes. The *Sále* or *Sáliga* are also Telugu by origin, and comprise the *Padmasále* or *Paṭṭasále*, who are worshippers of Vishnu, and the *S'akunasále*, who are worshippers of *S'iva* and wear the *linga*. The two sects do not intermarry. The *Bilimagga*, most numerous in Mysore District, call themselves *Kuruvína Banajiga*, and regard the former designation as a nickname. They are an indigenous caste and speak *Kannaḍa*: worshippers of *S'iva*. The *Séniga*, confined to Kolar and Bangalore Districts, are a wealthy caste of weavers, immigrants from the lower Carnatic, and speak *Kannaḍa*. They specially manufacture cloths for female wear, of superior kind and high value. They are *Lingáyits* by religion, but are not friendly with the other *Lingáyits*.

The *Paṭvegár*, of whom the majority are in Bangalore District, are silk weavers and speak a language allied to *Mahratti*. They worship all the Hindu deities, but especially the *S'akti* or female energy, to which a goat is sacrificed on the night of the *Dasara* festival, a *Musalman* officiating as slaughterer, for which he receives certain fees. After the sacrifice the family of the *Paṭvegár* partake of the flesh. The caste have the reputation of not being over cleanly in their habits. The *Khatri*, all but two being in the Bangalore District, are also silk weavers, and in manners, customs and language are akin to the *Paṭvegárs*, but do not intermarry with them, though the two castes eat together. They claim to be *Kshatriyas*. The *Sauráshtraka*, commonly known as *Paṭnúli* or *Jamkhánvála*, are, all but 7, in the Bangalore District. They manufacture superior kinds of cotton and woollen carpets, and also shawls of cotton and silk mixture. They are worshippers of Vishnu.

The *Góniga* (1,205), as already described above, are sack weavers. More than a half are in the Bangalore District. Other divisions are *Janapa* (32) and *Sádhuvams'astha* (189), the latter all in Tumkur District. Some are agriculturists, and some grain porters.

The *Agasa* or *Asaga* are washermen. They are divided into *Kannaḍa Agasa* and *Telugu Agasa*, who neither eat together nor intermarry. But there are numerous subdivisions, named *Belli*, *Dhobi*, *Halemakkalu*, *Iraganṭi Maḍiváli*, *Kápusákalaváḍu*, *Maḍiváli*, *Morasu*, *Murikináṭi*, *Paḍata*, *Sákalaváḍu*, *Tamil* and *Vannan*. The

Agasa is a member of the village corporation and his office is hereditary. Besides washing he bears the torch in public processions and at marriages. The class seldom follow any other profession than that of washing. Both men and women wash. Their proper beasts of burthen are asses, and these are sometimes employed in carrying grain from one place to another. Their principal object of worship is Ubbe, the steam which causes the garments to swell out in the pot of boiling water in which dirty clothes are steeped. Animals are sacrificed to the god with the view of preventing the clothes being burnt in the Ubbe pot. Under the name of Bhume Deva there are temples dedicated to this god in some large towns, the services being conducted by pújáris of the Agasa caste. They also worship Vishnu and other gods. Their gurus are Sátánis.

The *Golla* are cowherds and dairymen. The Káđu or forest Golla (21,820) are distinct from the U'ru or town Golla (15,618) and other Golla (82,357) who belong to villages, and the two neither eat together nor intermarry. The subdivisions of the caste are very numerous and are returned as follows:—Alla, Arava, Bokkasada, Bigamudre, Chapprada, Chóliya, Dodđi, Eđaiyar, Gauli or Kache Gauli, Gaubans, Gáyakaváđi, Gópála, Gúdejangáliga, Hálu, Jambala, Kankár, Kannáđa, Karáđi, Karma, Karņe, Kaváđiga, Kempu, Kilári, Kolalu, Konár, Kúduchappara, Kuri, Mande, Nalla, Námadakula, Náyi, Páta, Pátayáđavalu, Púja, Punagu, Púri, Rája, Salja, Sambára, Sonņan, Svári, Tellapúsala, Telugu, Yađayar, Yákula, and Yáđavakula. They worship Krishna, who is said to have been born in the caste. Formerly they, or a section of them, were largely employed in transporting money, both public and private, from one part of the country to another, and are said to have been famed for their integrity in such matters. From this circumstance they are also called Dhanapála or treasury guards. The Káđu Golla are mostly in Tumkur District, and a good many in Chitaldroog District. They live in thatched huts outside villages and are inclined to be nomadic. Some of their customs resemble those of the Káđu Kuruba.

The *Kuruba* are shepherds and weavers of blankets or camblets (*kambli*). The Káđu Kuruba have already been noticed under forest and hill tribes. The remaining great body of the civilized are divided into two tribes, the Hande Kuruba and Kuruba proper, who have no intercourse with one another. The latter worship Bire Dévaru and are Sivites. Their priests are Brahmans and Jógis. The caste also worship a box, which they believe contains the wearing apparel of Krishna, under the name of Junjappa. The subdivisions of the caste are Báne, Banige, Banni, Belli, Birappana Wokkalu, Byálada,

Gauḍakula, Haḷe, Haḷḷi, Hálu, Heggāḍe, Hosa, Jádi, Jaṭṭedévara, Kambaḷi, Kanakaiyanajáti, Kannaḍa, Kenchála, Kotta, Kuri, Máji, Majjana, Majjige, Páta, S'ále, Sávantī, Suggala, and Toppala. The Hálu Kuruba (191,087), Hande Kuruba (7,944), and Kambali Kuruba (7,792), are mostly weavers of kamblis. Parts of Chitaldroog and the town of Kolar are noted for the manufacture of a superior kind of a fine texture like homespun. The women spin wool.

The *Gániga* are oilpressers and oilmongers. They are known by different names, according to the special customs of their trade, such as Heggániga, those who yoke two oxen to the stone oil-mill; Kirugániga (principally in Mysore District), those who make oil in wooden mills; Wontiyettu Gániga, those who use only one bullock in the mill. They are also known collectively as Jótipaṇa or Jótinagara, the light-giving tribe. The other subdivisions are Kannaḍa, Telugu and Setṭi. There is a small section called Sajjana, who wear the *linga* and have no intercourse with the others. But the caste generally includes worshippers both of Vishnu and Siva.

The *Kumbára* are potters and tile-makers, and members of the village corporation. Of the two main divisions of Kannaḍa and Telugu, the former claim to be superior. The subdivisions are Gauḍakula, Gunḍikula, Kos'ava, Kulála, Náviḡe, S'áliváhana, Tamil and Váḍama.

The *Uppára* or saltmakers are so called chiefly in the eastern Districts; in the southern they are called Uppaliga and in the western Mélusakkare. There are two classes, the Kannaḍa and the Telugu. The former are principally engaged in making earth-salt, and the latter as bricklayers and builders. The well-to-do or Sreshṭha also undertake public works on contract and the erection of ordinary Hindu houses. They are both Vishnuites and S'ívites.

The small body of *Sarige* or gold-lace makers are Ráchevár by caste. They are all in the Bangalore and Kolar Districts.

The *Besta* are fishermen, boatmen and palanquin-bearers. This is their designation principally in the east; in the south they are called Toreya, Ambiga and Parivára; in the west Kabyára and Gange-makkalu. Those who speak Telugu call themselves Bhoiyi. There are some other smaller sections of inferior rank, named Belli, Bhoja, Chammaḍi, Kabbáliga, Pálaki, Pályapat, Ráyarávuta and Sunnakallu. The latter are lime-burners. Many of the females are cotton-spinners and some of the men are weavers of cloth. There are also some in the employment of Government as peons and in other capacities. Most of the caste are worshippers of Siva.

The *Iḍiga* are toddy-drawers, their hereditary occupation being to

extract the juice of palm-trees and to distil spirits from it. In the Malnád they are known as Halepaika (15,000), and were formerly employed as soldiers under the local rulers. Many of them are now in household service. Most of them also hold land, and are agriculturists. The other subdivisions are Bilva, Dévar, Sigroyidalu, Telugu Sánar, Tenginahále. They worship all the Hindu deities, as well as S'aktis, and especially the pots containing toddy.

The *Holeya* and *Máddiga* form the great body of outcastes. The former have already been described above (p. 215). These, in addition to their duties as village watchmen, scouts and scavengers, are employed as field-hands, and in all kinds of manual labour. They also make various kinds of coarse cotton or woollen cloths in hand-looms, while the Alemán furnish recruits for the Barr sepoy regiments. There are two tribes, Kannaḍa and Telugu Holeya, who eat together but do not intermarry. Their subdivisions are very numerous, but the following are said to be the principal ones:—Kannaḍa, Gangaḍikára, Maggada, Morasu, Telugu, Tigula and Tamil Holeya or Pareya. The minor sections are Agani, Alemán, Balagai, Bellikula, Bhúmi, Chakra, Chalavádi, Chambula, Chavana, Chillaravár, Dásari, Gollate, Jhádmáli, Jintra, Jóti, Kálu, Karnátaka, Kápu, Konga, Kurupaṭṭe, Lókóttara-pareya, Madya, Mála, Masalu, Mattige, Nágaru, Nallár, Pále, Paḷli, Panne, Pasali, Rampada, Roppada, Sambu, Sangu, Sára, S'iḍḷukula, Sómés'a, Tanga, Tangala, Tirukula, Tuḍe, Tóṭi, Uggránada, Vaḍaga, Valange, Vannè, Varka, Velagi, Vellála, Vaḷḷuvár, Veluva, Vanniyar, Vírabhagna and Vírasambu.

They are regarded as unclean by the four principal castes, and particularly by the Brahmans. In the rural parts, especially, when a Holeya has to deliver anything to a Brahman, he places it on the ground and retires to a distance, and when meeting one in a street or road he endeavours to get away as far as possible. Brahmans and Holeyas mutually avoid passing through the quarters they respectively occupy in the villages, and a wilful transgression in this respect, if it did not create a riot, would make purification necessary, and that not only on the part of the higher caste but even on the part of the lower. With all this, there is no restriction in the Mysore State on the acquisition of land or property by Holeyas, and under the various blending influences of the times—educational, missionary, and others—members of this class are rising in importance and acquiring wealth. So much so that in the cities and large towns their social disabilities are, to a great extent, being overcome, and in public matters especially their complete ostracism can hardly be maintained.

In the Maidán parts of the country, the Holeya, as the *kulavádi*, had

a recognized position in the village, and has always been regarded as an ultimate referee in cases of boundary disputes. In the Malnád he was merely a slave, of which there were two classes,—the *huffúdl*, or slave born in the house, the hereditary serf of the family; and the *mannúdl*, or slave of the soil, who was bought and sold with the land. These are, of course, now emancipated, and are benefiting by the free labour and higher wages connected with coffee plantations, often to the detriment of the areca-nut gardens, which were formerly kept up by their forced labour.

The Mádiga are similar to the Holeya, but are looked down upon by the latter as inferior. They are *tóti*, or village scavengers, and *nirganti*, or watermen, in charge of the sluices of tanks and channels, regulating the supply of water for irrigation. They are principally distinguished from the Holeya in being workers in leather. The carcasses of dead cattle are removed by them, and the hides dressed to provide the thongs by which bullocks are strapped to the yoke, the leather buckets used for raising water in *kapile* wells, and other articles required by the villagers. They are also cobblers, tanners and shoemakers, and the increasing demand for hides is putting money into their purses.

Their subdivisions are Arava, Chakkili, Chammar, Gampa, Gampasále, Goppasále, Heđigebúvva, Kanchala, Kannađa, Marabúvva, Morasu, Mátangi, Tirukula, Singáđi, Tanigebúvva, Telugu, U'ru and Vaináđu. They are worshippers of Vishnu, S'iva and S'aktis, and have five different gurus or mađhs in the Mysore country, namely, at Kađave, Kóđihalđi, Kongarđi, Nelamangala and Konkallu. They also call themselves Jámbava and Mátanga. There is, moreover, a general division of the caste into Des'abhága, who do not intermarry with the others. Though subordinate to the mađhs above mentioned, they acknowledge S'rívaišnava Brahmans as their gurus. The Des'abhága are composed of six classes, namely, Biļlóru, Mallóru, Amarávatiyavaru, Munigaļu, Yanamalóru and Morabuvvadavaru.

Certain privileges enjoyed by the Holeya and Mádiga in regard to temple worship will be found described in connection with Melukođe and Bélúr.

The *Móchi* (746) are not to be classed with the Mádiga, except in the matter of working in leather. They are immigrants, who, it is said, came into Mysore with Khasim Khan, the general of Aurangzeb, and settled originally in Sira and Kolar. They claim to be Kshatriyas and Rájputs, pretensions which are not generally admitted. They are shoemakers and saddlers by trade, and all S'aivas by faith. They have subdivisions called Gujarat, Kannađa, Kempala and Maráđa.

The next class (E) is styled Vagrant Minor Artisans and Performers, and is composed of the following groups :—

Earth-workers and Stone-dressers	...	Woḍḍa	...	107,203	
Mat and Basket-makers	..	...	Méda	...	4,261
Hunters and Fowlers	...	...	Béda	...	217,128
Miscellaneous, and Disreputable Livers	...	Jógi, &c	...	10,884	
Tumblers and Acrobats	...	...	Domba, Jetṭi	...	3,703
Jugglers, Snake-charmers, &c	...	...	Garadiga	...	876

The large and useful class of *Woḍḍas* is composed of *Kallu Woḍḍa* and *Maṅṅu Woḍḍa*, between whom there is no social intercourse, nor any intermarriage. Both worship all the Hindu deities and S'aktis, but a goddess named Yellama seems to be a special object of reverence. The *Kallu Woḍḍa* are stonemasons, quarrying, transporting, and building with stone, and very dexterous in moving large masses of it by simple mechanical means. They consider themselves superior to the *Maṅṅu Woḍḍa*. The latter are chiefly tank-diggers, well-sinkers, and generally skilful navvies for all kinds of earthwork, the men digging and the women removing the earth. Though a hard-working class, they have the reputation of assisting professional thieves in committing dacoities and robberies, principally, however, by giving information as to where and how plunder may be easily obtained. The young and robust of the *Maṅṅu Woḍḍa* of both sexes travel about in caravans in search of employment, taking with them their infants and huts, which consist of a few sticks and mats. Wherever they obtain any large earthwork, they form an encampment in the neighbourhood. The older members settle in the outskirts of towns, where many of both sexes now find employment in various capacities in connection with sanitary conservancy. The *Woḍḍa*, as their name indicates, were originally immigrants from Orissa and the Telugu country, and they generally speak Telugu. They eat meat and drink spirits, and are given to polygamy. The men and women of the caste eat together. The subdivisions are *Bailu*, *Bhója*, *Bóyi*, *Hále*, *Jarupa*, *Jangalpaṭṭe-burusu*, *Telugu*, *Tigala*, *Uppu* and *U'ru*. They are most numerous in the eastern and northern Districts.

The *Méda* or *Gauriga* are mat and basket-makers, and workers in bamboo and cane. One-fourth are in Shimoga District, and a good number in Mysore and Kadur Districts.

The *Béda* or *Náyaka* consist of two divisions, Telugu and *Kannaḍa*, who neither eat together nor intermarry. One-third of the number are in Chitaldroog District, and the greater proportion of the rest in Kolar and Tumkur Districts. They were formerly hunters and soldiers by profession. Most of the Mysore Pallegars belong to this caste, and

the famous infantry of Haidar and Tipu was largely composed of Bédas. Now their principal occupation is agriculture, labour and Government service as revenue peons and village police. They claim descent from Válmiki, the author of the Rámáyana, and are chiefly Vaishnavas, but worship all the Hindu deities. In some parts they erect a circular hut for a temple, with a stake in the middle, which is the god. In common with the Golla, Kuruba, Mádiga and other classes, they often dedicate the eldest daughter in a family in which no son is born, as a Basavi or prostitute; and a girl falling ill is similarly vowed to be left unmarried, which means the same thing. The main divisions are Hálu (3,929), Náyaka (15,453), Pállegár (48), Báríka, Kannaiyanajáti, Kirátaka, and Máchi or Myása (9,175). The minor subdivisions are Arava, Bála-jógi, Gujjári, Halli, Kanaka, Moḍayavaru, Muchchalamire, Mugla, Nági, Telugu and Yanamala. The Máchi or Myása, also called Chunchu, call for special notice. Many of them live in hills and in temporary huts outside inhabited places. The remarkable point about them is that they practise the rite of circumcision, which is performed on the boys of ten or twelve years of age. They also eschew all strong drink, and that so scrupulously that they will not use materials from the date-palm in their buildings, nor even touch them. On the other hand they eat beef, but of birds only partridge and quail. Possibly these peculiarities may have arisen from forced conversion to Islam in the days of Tipu. With the Musalman rite they also combine Hindu usages at the initiation of boys, and in the segregation of women in child-birth follow the customs of other quasi jungle tribes. The dead are cremated, and their ashes scattered on tangaḍi bushes (*cassia auriculata*).

In the Miscellaneous group the *Jógi* (9,692) are the most numerous. They are mendicant devotees recruited from all castes. Their divisions are Ganṭijógi, Gorava, Heḷava, Jangáliga, Monda, Pákanáti, Pichchakunte, Sillekyaṭa and Uddinakorava. They mostly pretend to be fortune-tellers, while the Jangáliga and Pákanáti deal in drugs, and wander about calling out the particular diseases they profess to cure by means of their wares.

The *Buḍubudike* (1,092) are gypsy beggars and fortune-tellers from the Mahratta country, one section being called Busáre: They pretend to consult birds and reptiles, and through them to predict future events. They use a small double-headed drum, which is sounded by whisking it about so as to be struck by the knotted ends of a string attached to each side. The others of this group of beggars are Suḍugaḍusidda (46), Gondaliga (29), Pandáram and Valluvar (15), Karma (7), and S'ániyar (3). The first are all in Shimoga District, and the last three in the Civil and Military Station of Bangalore.

The Tumblers and Acrobats include Domba (2,500) and Jaṭṭi (1,203). The former are buffoons, tumblers, and snake-charmers. They are supposed to be descendants of an aboriginal tribe from the north of India (Doms probably). The Jaṭṭi or Jeṭṭi, also called Musṣṭiga in the western Districts, are professional athletes and wrestlers, or Malla. They are Ráchevár by caste. Nearly a half are in the Mysore District. A number are maintained in connection with the palace, and are trained from infancy in daily exercises for the express purpose of exhibition. An interesting account of this order, as it existed at the beginning of the century, extracted from Wilks, was given in the first edition.

The group of Gáruḍiga and Móḍihidiyuva consists of jugglers, snake-charmers, and conjurers.

The last class (F) is styled Races and Nationalities, numbering 291,168, and includes the Musalmans and Europeans, with Eurasians and Native Christians. The following are the figures :—

Asiatic Races of reputed foreign origin—						
Musalmans	...	...	...	...	...	244,601
Parsis, Jews, Chinese, &c	...	...	...	...	...	79
Mixed Asiatic Races—						
Labbe	...	...	...	...	...	3,717
Pinjári	...	...	...	...	...	2,180
Pinḍári	...	...	...	...	...	2,048
Mápile and others	...	...	...	...	...	427
Non-Asiatic Races—						
English, Scotch and Irish	...	...	...	...	...	5,943
Other Europeans	...	...	...	...	...	288
Eurasians	..	...	...	...	...	3,931
Native Christians	...	...	...	...	...	27,954

The Musalmans belong to one of two religious sects—the Sunni and Shiah—the great majority being Sunnis. They are so called from accepting the Sunnat or traditional law, based on the sayings and practice of Muhammad, as of authority supplementary to the Kurán. They also revere equally the four successors of the prophet, alleging that he made no arrangements for hereditary succession and left the matter to the faithful. The Shiahs, on the other hand, attach supreme importance to the lineal descent of the Imám or head of the faithful. They therefore reject the claims of the three Khalifs that succeeded Muhammad and recognize Ali, the fourth Khalif, husband of Fatima, the prophet's only surviving child, as the true Imám, followed by their two sons Hasan and Husain. To the usual formula of belief they add "Ali is the Khalif of God."

The following is the distribution of the Musalmans in the several

Districts. There are also 892 Sharif, 244 Meman, and 861 returned only as Musalmans, besides 28 Arabs, 2 Kandaháris, and 2 Baluchis.

Class.	Bangalore.	Kolar.	Tumkur.	Mysore.	Hassan.	Shimoga.	Kadur.	Chitaldroog
Shekh ...	38,923	8,831	14,247	28,634	9,324	18,834	10,912	12,842
Saiyid ...	11,407	6,541	3,009	2,327	1,705	4,470	1,943	2,271
Mughal ...	1,999	1,264	1,032	1,413	481	2,615	376	237
Pathan ...	11,057	4,937	4,462	7,586	1,828	3,753	2,117	1,839
Hanifi ...	33	6	127	433	139	343	14	3
Daire ...	2,419	—	1	80	—	—	—	—
Labbe ...	1,098	199	92	1,973	67	119	161	8
Mápíle ...	28	—	—	18	71	20	41	—
Pinjári ...	124	447	617	—	26	10	1	955
Pindári ...	180	—	808	1,027	—	33	—	—
Total ...	67,268	22,225	24,395	48,491	13,641	30,197	15,565	18,155

The four classes first above given are those of reputed pure descent. But although good families doubtless remain in various parts, the bulk are of mixed descent, due to intermarriage and conversions, voluntary or enforced. Shekh denotes properly a lineal descendant from Muhammad through his successors Abu Bakr and Umar; and Saiyid, a descendant through his son-in-law Ali and Husain. But these titles have probably been often assumed by converts promiscuously without reference to their signification. Pathans are of Afghan origin, descendants of Kutb-ud-Din, the founder of the Pathan dynasty, and his followers; while Mughals are descended from Tartar chiefs who followed Tamerlane into India. The Sharif, nearly all in Tumkur District, claim to be descended from nobility.

The Hanifi are a sect of Sunnis who follow the teachings and traditions of Abu Hanifa, one of the four great doctors of Islam. In practice one of their principal distinctions is in multiplying ceremonial ablutions. The Daire or Mahdavi are a sect peculiar to Mysore, principally settled at Channapatna in the Bangalore District, and at Bannur and Kirigával in the Mysore District. Their belief is that the Mahdi has already appeared in the person of one Saiyid Ahmed, who arose in Gujarát about 400 years ago claiming to be such. He obtained a number of followers and settled in Jivanpur in the Nizam's Dominions. Eventually, being worsted in a great religious controversy, they were driven out of the Haidarabad country and found an abode at Channapatna. They have a separate mosque of their own, in which their priest, it is said, concludes prayers with the words "the Imám

Mahdi has come and gone," the people responding in assent, and denouncing all who disbelieve it as infidels. They do not intermarry with the rest of the Musalmans. The Daire carry on an active trade in silk with the western coast, and are generally a well-to-do class.

The Arabs, Kandaháris and Balúchis are mostly in Bangalore, and come here as horse-dealers and traders in cloth.

The Labbe and Mápíle¹ are by origin descendants of intermarriage between foreign traders (Arabs and Persians), driven to India by persecution in the eighth century, and women of the country, but the latter designation was taken by the children of those forcibly converted to Islam in Malábar in the persecutions of Tipu Sultan's time. The Labbe belong to the Coromandel coast, their principal seat being at Negapatam, while the Mápíle belong to the Malabar coast. The former speak Tamil and the latter Malayálam. The Labbe are an enterprising class of traders, settled in nearly all the large towns. They are vendors of hardware, collectors of hides, and large traders in coffee produce, but take up any kind of lucrative business. They are also established in considerable strength as agriculturists at Gargesvari in the Mysore District.

The Meman, all in the Civil and Military Station of Bangalore, are immigrants from Cutch, come here for trade. By origin they appear to have been Rajputs. The Pinjári, as their name indicates, are cleaners of cotton. They do not intermarry with other Musalmans, who as a rule have no intercourse with them. The Pindári were to a great extent Afghans, Mahrattas and Jats in origin, disbanded from the service of the Mughal empire, but became known as a tribe of freebooters who ravaged India on a grand scale, with large armies, and gave rise to many wars. They were finally suppressed in Central India in 1817 in the time of the Marquess of Hastings. They are now settled down in the pursuit of peaceful occupations in agriculture and Government service of various kinds.

The Parsis (35) are from Bombay, and engaged in trade, except a few who are in Government service. One-half are in Mysore, and most of the remainder are in Bangalore. Of the Jews (25), the majority are in Hassan District, relatives of an official there. The Armenians (8), Chinese (7), Burmese (4), and Singalese (3), are all in Bangalore.

Of Europeans (6,231), the following is the distribution of the nationalities that are strongest in numbers :—

¹ Labbe is supposed to be derived from the Arabic *labbaik*, "here I am," being the response of slaves to the call of their masters. Mápíle is apparently from Mápilla, Malayálam for "son-in-law."

Nation.	Bangalore.		Kolar.	Túmkúr.	Mysore.	Hassan.	Shimoga.	Kadur.	Chitaldroog.
	C. and M. Station.	District.							
English ...	3,933	287	216	27	215	128	31	191	17
Scotch ...	303	1	—	—	3	—	—	—	—
Irish ...	583	1	—	—	1	1	—	6	—
French ...	62	2	1	—	6	2	1	1	—
German ...	44	4	—	—	2	1	—	3	—
Italian ...	2	1	85	—	2	—	—	—	—

Of those from the United Kingdom, a considerable proportion in the Civil and Military Station of Bangalore belong to the British Army. Such as are not included in the military are engaged in civil employ of various kinds under Government, or Railway Companies, and in business or trade, while a number are missionaries, pensioners, and so forth. The Europeans in Kolar District are mostly connected with the gold mines, all the Italians there being miners. Those in Mysore who are not Government servants or employed under the Palace, are as in Bangalore. The Europeans in Kadur and Hassan Districts are principally coffee-planters. Besides the foregoing there are eleven Spaniards, eight Swiss, four Austrians, two Belgians, two Danes, and twenty-four others. Nearly all are in Bangalore, except six of the Swiss, who are in Kadur District.

The Eurasians number 3,931, of whom 2,649 are in the Civil and Military Station of Bangalore, and 401 in the Bangalore District. In the other Districts there are 276 in Kolar, 17 in Túmkúr, 208 in Mysore, 97 in Hassan, 16 in Shimoga, 229 in Kadur, and 38 in Chitaldroog. The remarks under Europeans in great measure apply to these also, but they are as a rule in more subordinate positions. Anglo-Indian and Eurasian colonies have been formed at Whitefield and Sausmond, about fifteen miles to the east of Bangalore, the residents of which are occupied in agriculture and dairy-farming.

The Native Christians are mostly Hindu by origin. Of the total number of 27,954, as many as 10,252 are in the Civil and Military Station, and 5,404 more in the District of Bangalore. Of the remaining Districts there are 2,418 in Kolar, 699 in Túmkúr, 2,509 in Mysore, 3,067 in Hassan, 1,603 in Shimoga, 1,773 in Kadur, and 229 in Chitaldroog. A large number are no doubt domestic servants to Europeans and Eurasians, but they are found in all grades of life, and a certain proportion are settled in agricultural villages of their own, established by various missionary agencies. This is especially the case in the eastern and southern Districts. The Christian settlement of Sathalli in the Hassan District dates from the time of the Abbé Dubois, the beginning of the century.

URBAN POPULATION

The (1891) population of 4,943,604 is distributed in 16,882 towns and villages. The two cities of Bangalore and Mysore account for 254,414. Omitting these, the following is a table of the remainder :—

DISTRICT.	Towns and Villages containing a population of															
	Less than 200.		200 to 500		500 to 1,000.		1,000 to 2,000.		2,000 to 3,000.		3,000 to 5,000.		5 000 to 10,000.		10,000 to 15,000.	
	No.	Pop.	No.	Pop.	No.	Pop.	No.	Pop.	No.	Pop.	No.	Pop.	No.	Pop.	No.	Pop.
Bangalore ...	1,474	154,602	760	232,407	174	114,807	37	49,005	3	7,026	7	28,132	5	36,649	—	—
Kolar ..	1,958	195,483	722	212,312	126	86,672	29	39,969	3	7,928	2	7,024	3	18,871	2	22,771
Túmkúr ...	1,356	127,025	745	228,437	194	120,122	41	54,354	5	11,449	7	28,313	—	—	1	11,086
Mysore ...	1,080	123,051	1,006	328,636	464	315,269	154	212,687	21	51,058	11	42,095	4	22,419	1	12,551
Hassan ...	1,424	152,992	732	225,094	119	77,986	19	25,077	5	10,852	3	10,539	2	12,412	—	—
Shimoga ...	914	90,678	637	202,727	204	134,204	42	53,621	8	20,044	3	10,356	1	5,011	1	11,340
Kadur ...	675	55,702	760	118,953	115	79,775	34	42,223	4	10,048	2	8,490	2	14,872	—	—
Chitaldroog ...	504	53,531	451	146,758	167	110,686	46	60,736	7	18,437	2	9,390	2	14,446	—	—
Total ...	9,385	953,064	5,413	1,695,324	1,563	1,039,521	402	537,672	56	136,842	37	144,339	19	124,680	5	57,748

There are thus twenty-four towns with a population exceeding 5,000, namely,

Bangalore ...	180,366	Davangere ...	8,061	Nanjangud ...	6,421
Mysore ...	74,048	Chikmagalur ...	7,816	Harihar ...	6,385
Seringapatam ...	12,551	Anekal ...	7,419	Closepet ...	6,236
Kolar ...	12,148	Dod Ballapur ...	7,141	Hole Narsipur	5,758
Shimoga ...	11,340	Tarikere ...	7,056	Malavalli ...	5,639
Túmkúr ...	11,086	Devanhalli ...	6,693	Hunsur ...	5,141
Chik Ballapur	10,623	Hassan ...	6,654	Mulbagal ...	5,026
Channapatna ...	9,160	Sidlaghatta ...	6,572	Shikarpur ...	5,011

to which, in order to make up the totals given, must be added the large village of Agara in Mysore District, with 5,218 inhabitants; and the village of Wokkaleri in Kolar District, where the occurrence of a large festival at the time of the census raised the population to 7,273.

Besides these, there are seventy-four other smaller municipal towns, namely,

11 with population of over 4,000	26 with population of over 2,000
15 " " " 3,000	22 " " " 1,200

The town population may thus be reckoned as 626,558, forming 12·7 per cent. of the total.

To estimate the growth of towns during the present century the following statistics are available:—

Town	1852	1858	1871	1881	1891
Bangalore ...	134,628	175,630	142,513	155,857	180,366
Mysore ...	54,729	55,761	57,815	60,292	74,048
Seringapatam ...	12,744	14,928	10,594	11,734	12,551
Kolar ...	—	—	9,924	11,172	12,148
Shimoga ...	—	14,186	11,034	12,040	11,340
Túmkúr ...	—	9,339	11,170	9,909	11,088
Chik Ballapur ...	—	—	9,882	9,183	10,623

Except in Bangalore and Mysore these figures do not disclose any firmly established tendency to a decided increase in the urban population in the case of the principal towns.

Other particulars regarding the occupations, &c. of the people, are given under each District in Vol. II.

CHARACTER, DRESS, &c.

The people of Mysore are a hardy and well-formed race, fairer as a rule than those of the low country, and with regular features. "I have never," says Buchanan, "seen finer forms than even the labouring

women of that country frequently possess. Their necks and arms are in particular remarkably well-shaped."

In public character and disposition they may be described as the most conservative of the South Indian races. In practice, perhaps they exhibit a greater aptitude for the labours of the field and the tending of cattle than for other occupations. With the bucolic turn of mind there was no doubt much stolidity to be found among the agrestic hinds, and till lately predial slaves, but accompanied with blind devotion and simple fidelity to their masters. The better specimens of headmen, on the other hand, are dignified and self-reliant, commanding and gaining respect, proud of hospitality, sagacious observers, shrewd in conversation and with a vein of homely good sense and humour. The industrial classes and field-labourers are very hard-working, especially the women.

The dwellings of the people are generally built of mud, one-storeyed and low, with few, if any, openings outwards except the door, but possessed of courtyards within, surrounded with verandahs, and open to the sky. In the better houses these are well-paved and drained, while the wooden pillars are elaborately carved or painted. The huts of the outcaste and poorer classes are thatched, but the houses of the higher orders are covered with either terraced or tiled roofs, the latter, more especially in the west, where the rainfall is heavy.

The villages are pretty generally surrounded with a thick hedge of thorn, a protection in former days against the attacks of the Mahratta cavalry. For the same reason the entrance is often a flat-arched stone gateway, so constructed as to present an obstacle to a horseman. In the districts lying north-east from the Baba Budans, villages commonly have the remains of a round tower in the middle, a somewhat picturesque feature, erected in former days as a place of retreat for the women and children in case of attack. Most important villages and towns have a considerable fort of mud or stone, also the erection of former troublous times, when every gauḍa aimed at being a pálegar, and every pálegar at becoming independent. The fort is the quarter generally affected by the Brahmans, and contains the principal temple. The péte or market, which invariably adjoins the fort at a greater or less distance beyond the walls, is the residence of the other orders.

There is seldom any system in the arrangement of streets, which are often very roughly paved, and nearly always abounding in filth. The only motive for the formation of wide and regular streets in some of the towns is to provide for the temple-car being drawn round at the annual festival. All other lines of way are irregular beyond description. But improvements, both in laying out the streets and in their sanitation, are

now to be seen in many places which have been brought under municipal regulations.

White or coloured cotton stuffs of stout texture supply the principal dress of the people, with a woollen *kambli* as an outer covering for the night or a protection against cold and damp. Brahmans are bare-headed, the head being shaved all except the tuft at the crown (*juttu*), and most of the Hindus observe the same practice. The moustache is the only hair permanently worn on the face. The *dhotra*, a thin sheet, covers the lower limbs, one end being gathered into folds in front and the other passed between the legs and tucked in at the waist behind. A similar garment is thrown over the shoulders. To protect the head, a bright magenta worsted cap is often donned, such as a brewer's drayman wears, but not in the same jaunty manner, for it is pulled well down over the ears and back of the neck. This and a scarlet, green, or blue blanket are favourite articles of attire for the early morning or on a journey. In attending offices Brahmans wear a turban (*rumdl*) and a long coat (*angi*), either woollen or cotton. This also is more or less the costume of the merchant class. A fashion has sprung up among college students of wearing a sort of smoking-cap instead of a turban. The ryots are generally content with a turban and a *kambli*, with most frequently a short pair of drawers (*challana*). When not at work they often wear a blouse or short smock-frock.

The dress of the women is generally very becoming and modest. A tight-fitting short bodice (*kupsa*) is universally worn, leaving the arms, neck, throat, and middle bare, the two ends being tied in a knot in front. It is generally of a gay colour, or variegated with borders and gussets of contrasting colours, which set off the figure to advantage. In the colder parts, to the west, a somewhat loose jacket, covering all the upper part of the body and the arms, is worn instead. The *shire* or *sári*, a long sheet, the ordinary colours worn being indigo or a dull red with yellow borders, is wrapped round the lower part of the body, coming down to the ankle. One end is gathered into a large bunch of folds in front, while the other, passed across the bosom and over the head, hangs freely over the right shoulder. In the west it is tied there in a knot. The Brahmani women pass the lower end of the cloth between the legs and tuck it in at the waist behind, which leaves the limbs more free. Their heads too are not covered, the hair being gathered into one large plait, which hangs straight down the back, very effectively decorated at the crown and at different points with richly-chased circular golden cauls and bosses.

The Vaisya women are similarly dressed, but often with less good taste. As the fair golden-olive complexion natural to most Brahmani

girls is much admired, those of the sex who are not so fair smear themselves with saffron to produce a yellow tint, and not only on their cheeks but over their arms and legs. This practice, which seems very common with the trading class, is by no means attractive. Neither is the habit of blackening the teeth, adopted by married women. Many fair women are elaborately tattooed on the arms from the wrist to the elbow. The Súdra women generally gather the hair into a chignon or bunch behind, stuffed out with a fleece of wool, and run a large pin through, with an ornamental silver head to it, which is rather becoming. In the Malnad the women often do up the back hair in a very picturesque manner, with a plaited arrangement of the cream white *kétaki* blossom (*pandanus odoratissimus*), or even with orchid blossoms or pink cluster roses.

Ornaments are commonly worn in the ears and nose, and on the arms, with rings on the fingers and toes, and as many and costly necklets and chains round the neck as means will allow. Chains frequently connect the upper rim of the ear with the ornamental pin in the back hair, and have a pretty effect. The richer Brahmani and other girls wear silver anklets, often of a very ponderous make, which are by no means elegant. A silver zone clasped in front is a common article of attire among all but the poorer women, and gives a pleasing finish to the graceful costume.

It would be useless to attempt to go through a description of the varieties of Hindu dress in different parts. The only marked differences are in the Malnad, as described under Manjarabad, and the dress of the Lambáni women.

The Muhammadan dress for men differs chiefly in cut and colour, and in the wearing of long loose drawers. But for undress a piece of dark plaided stuff is worn like the *dhotra*. Muhammadans shave the head completely, but retain all the hair of the face. A skull-cap is worn, over which the turban is tied in full dress. The women wear a coloured petticoat and bodice, with a large white sheet enveloping the head and the whole person, and pulled also over the face.

The higher Hindus wear leather slippers, curled up at the toe and turned down at the heel, but the labouring classes wear heavy sandals, with wooden or leather soles and leather straps. The Muhammadans also wear the slipper, but smaller, and frequently a very substantial big shoe, covering the whole foot. Women are never shod, except occasionally on a journey, or in very stony places, when they sometimes wear sandals.

Members of the various Hindu orders are known by the sectarian marks painted on their foreheads. Married women commonly wear a wafer-spot or patch of vermilion, or sometimes of sandal-powder, on the

forehead. The Lingayits are known by the peculiar-shaped silver box, the shrine of a small black stone emblematic of the linga, which is worn suspended by a string from the neck and hanging on the chest. The working-classes of that order often tie the linga in a piece of handkerchief round the arm above the elbow. The commoner religious mendicants dress in a variety of grotesque and harlequin costumes. But garments dyed with red ochre or saffron are the commonest indication of a sacred calling.

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